LOCKWOOD'S GARDEN MANUALS

CULTURE OF POT PLANTS

HUGH C. DAVIDSON

The Culture of Pot-Plants IN Rooms, Greenhouses, & Frames

BY

HUGH C. DAVIDSON

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PREFACE

In the course of my work as a horticultural journalist, it has been my duty to reply to many thousands of correspondents who found themselves in difficulties, very often in connection with the management of pot-plants. Some of the difficulties, such as failures due to disease, required knowledge for their solution, but not a few called merely for a little common sense. It is astonishing the way in which some plants are treated. To mention only two instances, it seems to be a frequent practice for ladies to pour tea into pots of ferns, and I was once consulted about an aspidistra which had been regularly dosed with castor oil. If the victims contrive to exist for a time, it is regarded as proof that the treatment suits them, a method of reasoning not always confined to plants; but sooner or later they die an unnatural death, the number killed by mistaken kindness being probably not much less than that of those which die every year from neglect.

The experience gained from this extensive correspondence has been utilised in the present book. To keep down the price, it has been necessary to be concise; but I have also endeavoured to make every statement clear, and therefore have given a reason for it where one seemed to be required.

In the two first chapters will be found general directions for the management of plants in rooms, greenhouses, and

frames. In the other chapters the different kinds of plants suitable for the same purpose are grouped together, and any special points in their cultivation are mentioned. In this arrangement some overlapping is inevitable. A certain species might be placed in, say, the chapter entitled "Flowering Shrubs in Pots," or in the following one, "Winter-Flowering Plants." In the most important of such cases cross references are inserted; but when there is a doubt as to where a particular plant is dealt with it can be settled by a glance at the index.

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BY THE SAME AUTHOR

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VEGETABLE CULTURE

A PRACTICAL MANUAL

LONDON: CROSBY LOCKWOOD & SON

The Culture of Pot-Plants

CHAPTER I

POT-PLANTS IN ROOMS

If anybody would get an idea of the magnitude of the trade in pot-plants he should visit Covent Garden in the early hours of the morning. In normal times they arrive in long processions of vans coming from all directions, and when the market closes they are all gone. This happens week after week, month after month, year after year. Yet Covent Garden, though the greatest centre of distribution in the country, is only one of many where the same thing is continually going on. What becomes of these millions of plants? There would seem to be enough of them to fill every greenhouse and every room in the kingdom, yet the demand for more is incessant. The fact is that the majority of them are short lived — not necessarily because that is their natural habit, but because of the treatment which they receive at the hands of those who buy them. Some are acquired merely for a brief display, and are discarded as soon as they have served their purpose; others, by far the larger number, fail as the result of ignorance or neglect. If they were cultivated in a rational manner, an enormous amount of waste would be prevented, and a very large sum would be saved annually by the nation.

In the first place, it is important to choose good plants. Many are grown at express speed in hot-houses, and are

rushed into the market at the earliest possible moment. They are too tender to bear exposure to the air, and when they are placed in cold or draughty rooms they speedily collapse. This is the more likely to occur when they have been taken about the streets in barrows. Plants offered at the door should be viewed with suspicion; they may be all right or they may not be. Fraud is, unfortunately, not uncommon in such cases.

Unless a plant is obtained from a respectable nurseryman, it should be turned out of the pot to see if it is properly rooted. If there is an outer ring of soil which does not contain roots, it has recently been placed in a larger pot with the object of making it look more important, and the price asked for it is probably higher than it should be. If the roots are confused and torn, instead of coiling round the outside of the soil, it has just been lifted from the open ground, and should not be bought at any price. Flagging may be due merely to want of water. If the cause is more serious, inspection of the roots may reveal it. If a plant is wanted to last as long as possible in decorative condition, it should not be in full flower at the time it is purchased; it should have plenty of buds to follow those already open. It is most attractive, of course, when it is covered with flowers, but a considerable part of its season is then over. In suburban districts costermongers not infrequently offer plants in exchange for old clothes. In such cases they generally estimate the former at double their value and the latter at half of what it should be, so a sale is for them such extremely good business that they can afford to waste time in haggling.

But even when good plants have been obtained from a respectable firm, they are certain to deteriorate unless their wants are attended to properly. Those wants are food, water, fresh air, light, a suitable temperature, cleanliness, and certain other precautions for the preservation of health. Perhaps the most important of all is water, for a plant may be growing in the midst of food, yet unless water is present it must starve. In other words, its food must be in a liquid

form. It cannot absorb solid matter. It has nothing corresponding to the mouth and channels by which food is conveyed to the digestive apparatus in an animal, there to be prepared for distribution throughout the system. The food materials must be dissolved in water, so that they can be absorbed by the tips of the roots, from which they pass into the various cells through the cell walls until they reach

FIG. 1.—Plant (left) recently moved from larger pot; another (right) lifted from the ground; and a third (centre) which has been grown in the same pot for some time.

the leaves. There, under the influence of light, and with the addition of carbonic acid obtained from the air, they are transformed into sap, which is real plant food, the material of growth.

Water is therefore essential, but the amount varies with the species and with the season. Some species—aquatics and subaquatics—can live in water; others, the majority, are killed if there is too much. Their roots cannot grow or continue in a healthy condition without air, and if the soil is sodden the interstices between its particles are filled with

water instead of with air, the result being that the roots decay. Soil in this state is called sour. Lime-water will remove the sourness, but must not be used for such plants as heaths, azaleas, and rhododendrons, for lime is most injurious to them. Here, as always, prevention is better than cure; and though sufficient water should always be poured into a pot to wet the whole of the soil and reach all the roots, no more should afterwards be given until the soil is fairly dry again, when the process should be repeated. Obviously, the intervals between the waterings are very much shorter in summer than in winter. Most plants are then making their growth, and therefore using much moisture, while, owing to the higher temperature, there is also much loss from evaporation.

It follows that to the common question: "How often should I water my plants?" no definite answer can be given. There can be no fixed rule. It depends entirely on the conditions—on the temperature, the weather, the soil (for heavy soil holds moisture longer than light soil), on the species, and even on the individual. A geranium, for instance, will live under conditions of drought which would be fatal to a hydrangea, and an aspidistra will thrive in moisture that would kill a palm, while a plant which is making much growth needs more than one which is making little. One method of testing the condition of the soil is to tap the pot sharply with the knuckles. If a clear ringing sound is returned, water is required, the soil having shrunk away from the pot; if the sound is dull and muffled, the soil is not sufficiently dry to have shrunk much, and may be regarded as moist enough. The test, however, cannot always be relied on. In the case of plants which should be potted very firmly, such as chrysanthemums and palms, the soil, having been rammed, does not, when dry, shrink sufficiently to affect the sound, and experience is necessary to decide whether more water is required or not. Generally speaking, it is better in summer, during the growing period, to give too much water rather than too little; and in winter, during the resting period, to give too little rather than too much. When

a plant is not growing it needs only just sufficient water to replace any slight loss, and thus to prevent shrivelling of the tissues; any more will cause the roots to decay.

The temperature of the water is a matter of some importance. It may sometimes be higher than that of the room—to gloxinias, for instance, it is often given higher—but if it is lower it is liable to interfere with the growth of the plants, and a check of any sort, besides being bad in itself, renders

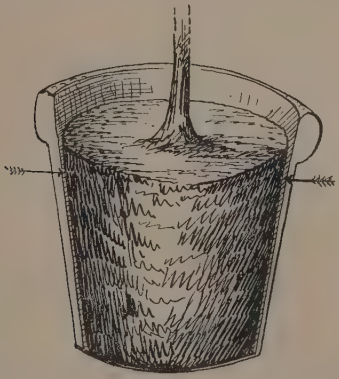


FIG. 2.—Plant kept too dry, the soil shrunk away from the pot.

them peculiarly susceptible to diseases and the attacks of insects. If, therefore, the water is drawn from the tap, it should not be used at once, or some warm water should be added to it. Of course, this also applies to water taken from an outside tank. Rain water is the best for all plants. For some kinds, such as heaths, azaleas, and rhododendrons, it is almost essential, for company's water is generally hard, and the lime in it is most injurious to them, and may kill them. It may be thought that a little occasionally will do no harm, but a sprinkle of water should never be given to any plants. It is worse than useless, for it does not benefit any roots

except those quite close to the surface, and the moisture there misleads as to the condition of the soil underneath.

If the soil is allowed to get dust-dry it is not easily

Fig. 3.—Watering a Hanging Basket by plunging it in a tub of water.

moistened again by means of the water-can, especially when it contains peat, for most of the water runs down the gap between it and the pot, and little, if any, reaches the centre. The best thing to do in such cases is to immerse the pot in a pail of water, and to leave it there for ten minutes or a quarter of an hour. Hanging baskets should always be

watered in this way. As the outside soil has only a thin layer of moss between it and the air, it soon gets excessively dry.

Only plain water should be used when the soil is very dry. It should not contain any sort of artificial fertiliser, for the dose, when not diluted by any other moisture in the soil, might be excessive; and even if it were not, the object of feeding is to supply the material of growth, and growth is impossible when the plant is in a flaccid condition. It must first be restored to health by replacing the water it has lost, and if the loss has been serious, it should be kept for a time in a close, still atmosphere and in a shaded position, so as to lessen the strain on its vital functions. In fact, it is temporarily in the same condition as a cutting, and should be treated in the same way.

The chief points as regards watering may be summed up thus:—

Give water not by rule, but in accordance with the requirements of the plants.

Never merely sprinkle the surface. When the soil becomes fairly dry, give enough to moisten it all thoroughly, if necessary immersing the pot in a pail.

In winter very little water is necessary, especially for deciduous species. Some plants, such as cactuses, do not require any.

When the soil is very dry, no fertiliser should be dissolved in the water.

Water which contains lime—hard water—should never be given to such plants as azaleas, heaths, and rhododendrons.

For all plants, rain water is the best.

It should never be colder than the atmosphere of the room.

Provided with plenty of water and a suitable temperature, plants are in a position to make use of what food materials are available; but if growth is to be satisfactory, these materials must be of the right kinds and in the right quantities. It is, therefore, necessary that suitable soil should be used, that it should be kept in good condition, and that the ingredients abstracted from it during the process of growth should be replaced.

The three principal ingredients in plant food are nitrate, phosphate, and potash. The two last remain in the soil until they are used by the plants, but the former quickly drains away. If, therefore, there is a deficiency, it is most likely to be in nitrate. Good potting soil, such as a mixture of three parts of turfy loam, two parts of leaf-mould or decomposed manure, and one part of sharp sand, contains all the food that is necessary. There is no need to add anything else for a time. There is much nutriment in old turf, which also

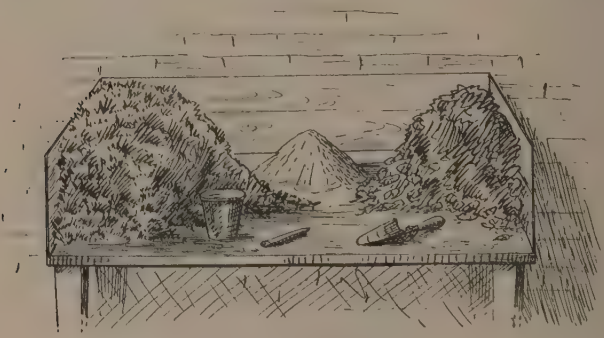


Fig. 4.—Potting Bench.

gives firmness to the whole, and much more in leaf-mould or decomposed manure. The sand has no food value, its only object being to keep the soil porous—that is, to provide spaces between the particles which air and water can penetrate, and through which surplus water can escape. When plants have been freshly potted in this mixture, they have all the food they can use; it is not until their roots have grown through it, and become matted at the side, that there can be any scarcity. The plants can then be transferred to larger pots, or else the food required can be supplied in the form of a fertiliser.

The three principal ingredients already mentioned—nitrate,

phosphate, and potash—can be obtained separately and then mixed. This is an economical thing to do if they are wanted on a large scale, but it is not worth while for the owner of a few pot-plants. The fertilisers sold in tins are ready mixed, and they are the most convenient form for small users. In every case the directions on the labels should be followed. The quantities advised should not be exceeded. If a plant grows well with a teaspoonful of fertiliser a week, there is a temptation to think that it will grow still better with two; and when it begins to fail under this treatment, some more obscure cause is generally sought for, though the double dose is really responsible. The annual mortality among pot-plants, as the result of mistaken kindness, is enormous. Excess of food is a poison, and in pots the roots cannot escape from it as they often can in the open ground, where, too, it may be diluted by the surrounding soil, and washed away by heavy rains.

Even when the fertiliser is not large enough to injure the plants, it may be large enough to be wasteful, for much of what they cannot use at once may drain away through the holes in the bottom of the pots after watering. For several reasons, therefore, it is better to give small doses at short intervals—say every third or fourth day—than large doses at long intervals.

The time to apply a fertiliser is when plants have exhausted the soil in the pots—that is, have filled it with roots—and are still making growth. It should never be applied to young seedlings, because they do not need it; and it should never be applied to larger plants towards the end of the growing period, or afterwards while they are at rest. The rate of growth gradually increases every year from the beginning of the season, until it reaches its maximum—for the majority of shrubs, trees, and herbaceous perennials, early in summer—and it then declines, and finally ceases. During its decline, the wood stems or crowns undergo what is called a ripening process, which not only enables them to endure the low temperature of winter, but also is essential to floral production in the following year. If growth is

stimulated by giving food and water when this process should be going on, the ripening may be so delayed that it cannot be completed. A fertiliser should therefore not be given late in the season to any perennials. It may, however, be given to annuals, with the object of keeping them growing and flowering as long as possible, because for them there is no ripening of the wood. At the end of their one season they die.

There are certain cases in which a fertiliser should not be given early. Pot-plants may be divided into two classes—those which are grown for their flowers, and those which are grown for their foliage. Obviously, the more growth the latter make, the better; and as food is necessary for that purpose, it should be given to them liberally, but not excessively. Flowering plants, however, occupy a different position. The flowering period and the growing period are not simultaneous. There may be, and often is, some overlapping, but the former naturally follows the latter. Where it seems to precede the latter, as in the case of early bulbs, the flowers are really formed in the previous summer or autumn, as may be proved by dissecting a plump daffodil bulb in winter, and examining it under the microscope, when the embryonic flowers will be seen complete in all their parts. Their development proceeds so far, and then is arrested by the drought of summer, or in other cases by the falling temperature of autumn, only to be renewed when the conditions become more favourable in spring. If the growing period is protracted beyond the usual time by the stimulus of food and water, the commencement of the succeeding flowering period must be delayed. A weed, such as groundsel, in a dry and infertile gravel path, flowers long before another in the rich moist soil of the border alongside. Similarly many plants—for instance, vallotas or Scarborough lilies—do not flower until their roots have filled the soil and exhausted much of the food in it; and if, when this stage is reached, they are transferred to larger pots, or given lavish supplies of food, the flowering period may be further delayed. There may be an additional reason why many pot-bound plants flower well.

Their roots, being in contact with their pots, are much more exposed to the influence of the sun's rays than those that are surrounded by soil, and thus the ripening process is more likely to be thorough.

Of course discretion must be used in withholding food with the object of inducing early flowering. A starved plant may flower sooner than one which is abundantly fed, but the flowers will certainly be smaller, and they will probably be fewer. Hence a compromise becomes necessary. The food should be sufficient in quantity to prevent stunting and to maintain a healthy condition. If a plant shows any failure which can be attributed to starvation, there should be no hesitation about feeding it. Apart from that, the time to apply a fertiliser is after the flower-buds appear, not before; but, as previously stated, it should be weak. If it is excessively strong it may cause the buds to drop, a not uncommon thing with fuchsias and begonias, the reason being that the strong stimulant induces vigorous growth into which the sap passes instead of into the flower-buds, and consequently the weak joints connecting the latter with the stalks give way. Properly used, a fertiliser will provide the material for increase in the size of the flowers, and render it possible for many to be produced in succession where this is the natural habit; it will also enable the plant to grow moderately, and to add to the internal store which every perennial species, especially bulbous species, possesses.

Briefly, the advice as regarding feeding may be put as follows:—

A weak fertiliser may do good; a strong fertiliser may do much harm, and sometimes may be fatal.

Give it two or three times a week so long as it seems to be beneficial. Always watch the effect.

Give it only to plants whose roots have filled their pots, never to those that have been freshly repotted, and never to young seedlings.

Take care that the soil has been previously moistened thoroughly.

Feed foliage plants during their growing period and up

to the time that growth ordinarily begins to slacken, not afterwards. Treat flowering plants in the same way, except that feeding should not commence until the flower-buds can be seen.

Don't experiment on your plants with strong food if you wish them to remain healthy. They may live in spite of being dosed with such things as tea and castor oil (see Preface). They could not live because of them.

Finally, do not attach any importance to the claims made in advertisements that certain patent fertilisers have marvellous properties. If they contain nitrate, phosphate, and potash in soluble form and in the right proportions, they may be considered complete plant foods; but their value lies solely in these ingredients, and any other fertiliser containing the same things in soluble form in the same proportions is quite as good. This might seem to rule out certain bacterial preparations which are on the market. They, however, are not plant foods. All that is put forward on their behalf is that under certain conditions they enable plants to obtain nitrate from the air, and thus reduce the amount which need be added to the soil.

We have briefly considered the soil and its constituents in connection with the growth of plants. The air plays a scarcely less important part in their development, for from it they obtain the carbon which enters largely into their composition. They cannot obtain it in any other way. There may be plenty of organic matter in the soil, but, as it decomposes, the carbon in it escapes in the form of carbonic acid gas; while if we put soot or charcoal in the ground, it cannot be absorbed by the roots, for both are quite insoluble.

The materials which the roots can absorb are, as previously stated, soluble nitrate, phosphate, and potash. These pass upwards into the leaves, which, by means of the tiny openings on their surfaces (the stomata), are capable of absorbing air and abstracting some of the carbonic acid from it, and there, under the influence of the sunlight, they are all acted on by the green colouring principle, the

chlorophyll, and are converted into the sap. Certain atmospheric conditions are therefore essential for healthy development—a sufficiency of carbonic acid gas in the air (and about this there need never be any doubt); moisture; no interference with the functions of the stomata; sunlight; and, of course, a suitable temperature.

FIG. 5.—Portion of Epidermis of Leaf (highly magnified), showing two stomata open and one closed.

In a room, especially when it is situated in a large town, it is not easy to satisfy these conditions perfectly; but if the plants are to remain healthy, every effort should be made to do so. Dust and dirt are most injurious. They settle on the leaves and, if allowed to remain, block the stomata, and so prevent the entrance of the necessary carbonic acid, with the result that the leaves turn yellow and wither. Cleanliness is therefore essential. It is a good plan to take advantage of a shower of rain and to stand the plants out

in it, though if they are soft-leaved they should not be in strong sunshine, as the sudden change from the close and gloomy atmosphere of a room to bright sunshine and air might cause them to flag owing to the great increase in the stimulus to their functional activities. They should also be sprayed at least once a week; or, if they have large shiny leaves like palms, aspidistras, or indiarubber plants, it is better to sponge them with lukewarm water, rubbing carefully from the stalk ends towards the tips in order to avoid kinking. A little soap may with advantage be dissolved in the water, but it should afterwards be washed off with clear water, as a film of soap will block the stomata even more effectually than a layer of dust.

In rooms in which oil is used for lighting purposes another difficulty arises. Some of it escapes unburned into the air, especially when the lamp has been badly trimmed or cleaned or has a defective draught, and is deposited on the colder surfaces around, such as the leaves of plants. It can easily be rendered visible by means of a bowl of water, on which it forms a thin film, as happens after any painting has been done. On plants this film acts in the same way as soap or dust. It stops what is called the breathing process, and, unless it is washed off, causes suffocation.

The impurities from the burning of gas and from ordinary fires, especially when the coal is of a sulphurous nature, are equally injurious. The plants which are most susceptible to such influences are those with delicate foliage, such as maidenhair ferns. They should always be kept as far away as possible from the source of the mischief. In some cases it may be necessary to remove them into another room which is less used.

But even if an atmosphere free from impurities could be obtained in a house, there would still remain the matter of dryness. Moisture in the air is as necessary to plants as moisture in the soil. If it were possible to put them in an enclosed space which had been freed from all moisture, they would immediately flag and quickly die, for there would be a rush of water in the form of vapour from them into the

dry air surrounding them, and as this rush would proceed at such a rate that the supply provided by the roots could not keep pace with it, their collapse would be inevitable. Moreover, another thing would happen -intense cold, the invariable result of the speedy conversion of a liquid into a vapour. That is why a draught is so deadly. In the process of sap-making by the leaves, water is produced and escapes in the form of vapour through the stomata. When this takes place at the normal rate, it merely keeps the leaves cool; but if it becomes very rapid, as happens when the water produced is instantly carried away by a current of air directed on some particular spot, the temperature there is lowered excessively, and congestion is the result, the organs being rendered incapable of performing their functions. A moist atmosphere is therefore necessary for healthy growth, and though the amount of moisture varies for different species—it need not, for example, be anything like so great for geraniums as for hydrangeas or ferns—the more there is, as a rule, the more luxuriant the growth. In greenhouses it often happens that the spores of ferns alight and germinate on the damp walls close to the pipes, on which, when they are heated, water is sprayed occasionally, and in this steamy atmosphere the plants grow in a remarkable way. But in a room the air is always comparatively dry—very much drier than it is outside in the country, where moisture is always exuding from the vegetation around as well as from the ground. This unfavourable condition cannot be greatly altered. All that can be done is to keep plants as far away as possible from all fires and lamps.

The natural position for them is near a window. In some respects it is the best position, for there they get more light than anywhere else. It is true that certain species, such as aspidistras and ferns, will live without direct sunshine; but even for them a moderate amount is beneficial, and for some others it is essential if they are to remain long in good condition. Those that have coloured foliage—coleus, for instance—will not acquire their colour without sunshine, and, if they have previously acquired it they will

lose it. A window, however, has its disadvantages. Every time it is opened the plants in or near it are in a draught, and if the door of the room is open at the same time the effect is deadly. Moreover, the changes of temperature are greater near a window than they are farther away. In winter the cold air outside impinging on the glass cools it, and thus cools the air in contact with it inside, producing currents of a low temperature—so low during severe frost that the plants exposed to them may be killed. Of course the effect is lessened when the blinds are drawn down between the plants and the glass, but at such times it is much safer to remove to a warmer position all species which are not quite hardy.

The chief points in this connection may be repeated briefly:—

Clean by washing or spraying the foliage of all pot-plants in rooms at least once a week.

Stand them out in the open air when the opportunity occurs, but not, if they have delicate leaves, in strong sunshine.

Keep them well away from fires and lamps.

Never let them be in a draught.

If they are in a window, draw down the blind between them and the glass in the evening in winter; and if the weather is very cold, remove them further into the room.

If any should be frozen, they should be treated as advised in the next chapter.

CHAPTER II

POT-PLANTS IN GREENHOUSES AND FRAMES

THE cultivation of plants is easier in greenhouses and frames than in rooms, because the conditions are much better. The air is purer and moister. The light is stronger, and, like the temperature, more under control. Ventilators and often doors can be opened to admit fresh air without causing an injurious draught. Water can be poured on the floor in hot, dry weather. Warmth can be obtained by lighting the stove, or, in the case of a frame, by placing it on a hot-bed. If shade is required, there is usually a shady corner, or blinds can be used, or the lights washed with one of the preparations sold for the purpose. For plants that grow best in full sunshine, there is the front row of the stage. In rooms, too, propagation by cuttings or seed is generally troublesome, and sometimes impossible; whereas in greenhouses, and, if a high temperature is not required, in frames it is a comparatively simple matter.

But the fact that plants grow more rapidly in such positions makes it more than ever necessary to manage them in such a way that the growth is what it should be. If they have not enough air it will be soft and sappy instead of firm, and they will fall easy victims to insects or disease. If they are crowded together and a long way from the glass, it will be long and straggling, for as it is formed under the influence of light, it must proceed in that direction just as the roots must follow the food out of which they make the additions to their length. In summer, therefore, while plants are growing, they should be kept as close as possible to the glass; and in

winter, when they should be resting, they should not be compelled to grow by means of an unnaturally high temperature and the stimulation of food and water; for as growth largely depends on the chemical or actinic rays which at that season are weak, any wood that is produced then must also be weak.

Of course a high temperature in winter is often maintained with the object of forcing plants out of their natural season. But when so treated they are rarely of much use afterwards. If it is desired to keep them in good condition, they should be allowed to rest when they ordinarily do so, and the temperature should be low enough to let them remain dormant. At the same time it should be high enough to prevent their being injured by cold. The degree necessarily varies with the species. In a greenhouse fitted with hot-water pipes and stove which is kept burning in winter, this is easily managed. It is in a cold house or in one which is only heated occasionally that losses occur.

It is a mistake to attempt to grow tropical plants in such a structure, but it is a common practice among amateurs, and failures are not likely to act as a deterrent. To minimise the risks, the plants should be kept dry—quite dry during severe weather—for it is not frost alone, but frost combined with damp that does the damage, for which reason fresh air should be admitted as often as possible. Much, too, can be done by covering the glass with matting, though this is more applicable to frames. In greenhouses newspapers laid over the plants will protect them from several degrees of frost, and those that are specially tender can be placed in boxes and covered at night.

In small greenhouses an oil lamp is sometimes used to exclude frost. It may serve this purpose, but if it is not perfectly clean, or is badly trimmed, or has a defective draught, it is sure to do more harm than good; for in this case some of the oil escapes unburnt into the air, and, coming in contact with the colder surface of the leaves, it is deposited on them and causes them to wither. If a lamp produces the slightest smell of oil, it should be regarded as unsafe; and

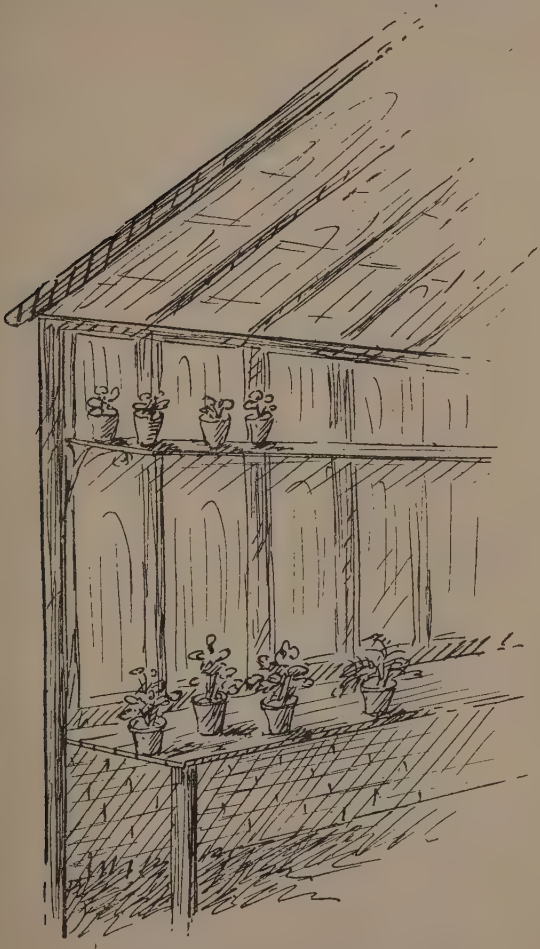


FIG. 6.—The nearer the light, the dwarfer the plants.

if it is used, an outlet—some sort of chimney leading outside—should be provided for it.

In spite of these precautions, it may happen occasionally that some plants will be found in the morning with limp and blackened foliage as the result of having been frozen during the night. In serious cases, where the tissues have been ruptured, it may be necessary to cut away the damaged parts in the hope that the remainder will survive; but very often the injury is only slight. When freezing takes place, much of the water in the cells passes out into the spaces between them, and it is this loss of water that causes the limpness and blackening. If the water can be restored to the cells, and restored slowly, no great harm will have been done. It is therefore essential that the plants should not be exposed to sunshine. They should be thawed gradually by being placed in the shade. Some authorities recommend that they should also be sprayed with cold—quite cold—water; but if that is done they should, in order to avoid damp in the greenhouse, be taken outside. In the case of plants, such as Richardias (arum lilies), with large leaves and soft stalks, this is not sufficient. If the stalks (unable to bear the weight of the leaves) kink, they cannot recover. Nothing that can then be done will enable them to stand erect again. To prevent this, the pots should be suspended upside down so that the stalks may hang straight, and, as they thaw, may stiffen in that position.

Cleanliness is as important in a greenhouse as it is in a room, but in order to avoid damp it is advisable not to have the floor washed in winter more often than is absolutely necessary. When it must be done, a sunny morning should be chosen for the purpose, and the ventilators should be opened. For the same reason water should not be splashed about. When cold weather comes, the rose should be taken off the can and not used again until spring. The water should be poured through the spout on to the soil, not over the foliage. If any plants require cleaning, they should be taken outside on a warm day and syringed there, and be brought back when they are dry. Dirty pots are a common

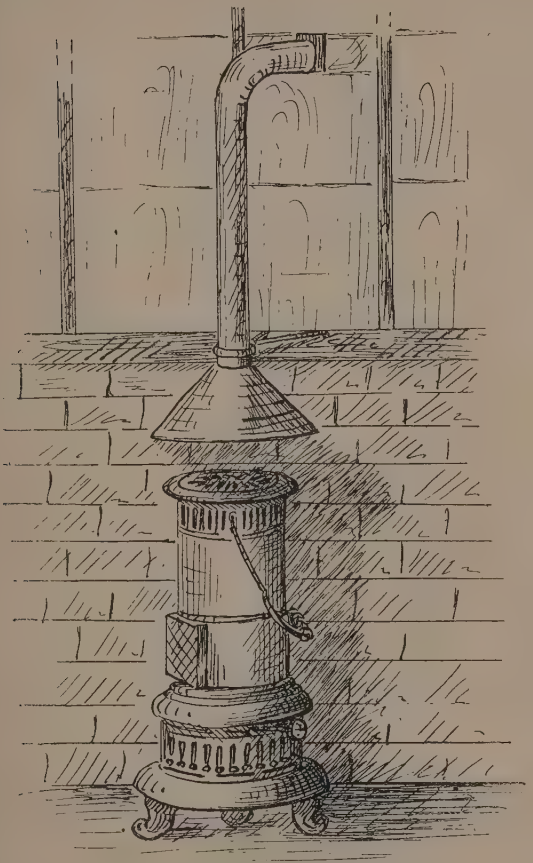


FIG. 7.—Oil Stove with outlet for fumes.

cause of disease. The slime which covers them offers a resting-place for germs, and also prevents the air from

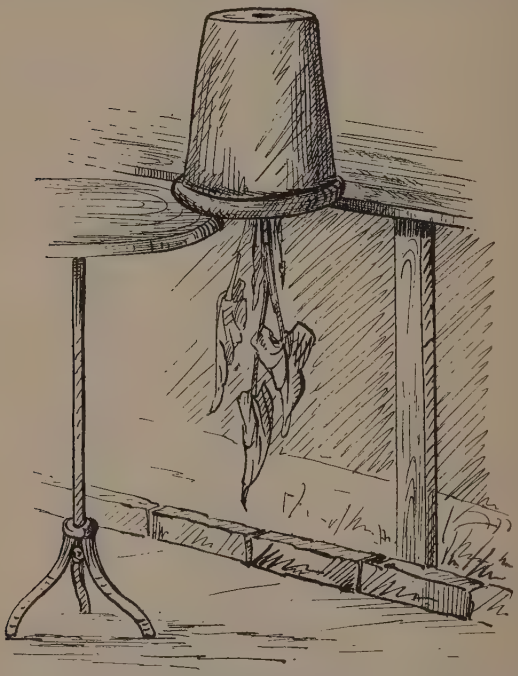


FIG. 8.—Frozen Richardia suspended upside down so that when it thaws the leaf stalks may stiffen straight.

reaching the roots. It should be washed off with soap and water applied with a hard brush, and if that does not get rid of it, a piece of brick should be used. If, however, the pots are very old, and especially if they are cracked, it is much better to transfer the plants to new ones, which should

first be well soaked in water. Unless this is done, the material of which the pots are composed is so absorbent that it may abstract so much moisture from the soil that the roots are dried up.

FIG. 9.—Examining the roots of a Fern, infested with the root-feeding mealy bug.

When plants turn sickly, the cause may be obvious at a glance. Insects may be seen on the leaves, or the nature of the injury may clearly indicate that they are the culprits. The leaves may be covered with dust, or with a film of oil from a lamp or from recent painting; or spots or other symptoms may point to fungoid disease. On the other hand, the cause

may be more obscure. In that case a sick plant should be turned out of its pot without disturbing the roots. If they are not healthy, insects may perhaps be found among them, or the soil may be excessively dry or excessively wet, too hard or too loose, or unsuitable in some other way. If another explanation must be sought, attention should be directed to the position. Is it too sunny or too shady, too hot or too cold, or is it draughty? As already pointed out, one sure cause of disease in such plants as heaths, azaleas, and rhododendrons is lime in the soil or in the water given to them.

There are three methods of getting rid of insects on pot-plants—fumigation, vaporisation, and spraying or washing. Fumigation consists in burning tobacco rag or paper. It has been almost entirely superseded by vaporisation—the heating by means of a lamp of various preparations sold for the purpose—which is more cleanly, and quite as effective. But when there are only a few plants, it is usual to resort to spraying or washing. Soapy water will do quite well, but there are many insecticides which are more powerful. All of them should be washed off a few hours later with clean water, and as they destroy only the insects, and not their eggs, they should be used several times. The first spraying should be done as soon as an insect is noticed. If it is delayed until an attack is well advanced, it is very much more difficult to get rid of the pests.

Fungoid diseases are far more troublesome, for they mostly develop inside the tissues, and only come to the surface to perfect their fruit, just as mushrooms do. When they become noticeable, the mischief is done. But even if the parts already attacked cannot be saved, it is often possible to confine an attack to those parts—to prevent its spreading to other parts of the same plant and also to different plants—and in time to stamp it out. In the majority of cases, when the attack is a bad one, it is safest to burn the affected plants in order to prevent the infection of others. When it is less serious, the foliage should be sprayed with a weak solution of permanganate of potash,

the water just tinged, or with a solution of fresh sulphide of potassium (liver of sulphur) at the rate of ½ oz. to the gallon. As the latter solution blackens paint, it cannot well be used in a greenhouse. Flowers of sulphur dusted over the foliage,

FIG. 10.—Parasitic fungus growing through one of the stomata in a leaf (greatly enlarged).

when damp, may be substituted for it when the disease is mildew.

But diseases and insects rarely attack plants when they are growing satisfactorily. The chief thing is to keep the latter in a healthy condition by attention to their cultural requirements as regards cleanliness, food, water, temperature,

and so forth. One common mistake should be avoided. A large quantity of food is as bad for a plant crippled by disease as it is for a sick human being. When a plant is making little or no growth it cannot use much food, and, as stated elsewhere, any excess in the soil becomes a poison. Of course, enfeeblement as the result of starvation is a different matter, but it should not be difficult to diagnose; and even then food should not be given in large amounts any more than it should be to a starving man. There cannot be any definite rule in such matters. The important point is to watch the effect. If a plant responds to food—if it grows all the better for a little—the amount may be slightly increased the next time; and if there is a further improvement, it may be increased again. But it is easy to give too much, and it is safer to give too little, especially to flowering plants.

CHAPTER III

ANNUALS AS POT-PLANTS

As the majority of annuals are easily managed in the open ground, it may seem a very simple matter to grow them in pots, yet a good deal of care is required. Unlike perennials, they have an exceedingly short growing period, and if their development at any stage is interfered with as the result of ignorance or carelessness, they have no chance afterwards of making good. Perennials may therefore be compared with long distance runners who, if they drop behind at the start, may yet finish in front. Annuals, on the other hand, have only a quick sprint before them, and if at any point they fall back into the ruck, they are most unlikely ever to emerge again. If only for this reason, and apart from the beauty of their flowers, it is an excellent thing for an amateur to grow some of them in pots, for they teach better than any other class of plants the importance of attention to small details.

There are plenty to choose from, among them asters, ageratums, alonsoas, antirrhinums, balsams, annual chrysanthemums, clarkias, dimorphotheca, forget-me-nots, linarias (toadflax), mignonette, mimulus, nemophila, nigella, nemesias, nasturtiums, petunias, phlox Drummondi, schizanthus, stocks, and sweet peas (dwarf). Of course all are not equally good or equally suitable. Nemophila has flowers of a beautiful blue, but its season is much shorter than that of nemesias or of schizanthus. The flowers of mignonette are not much to look at, but because of their sweet scent it is largely grown in pots, especially for winter. Balsams may be too tall for some positions, and nasturtiums too brilliant for others, but

all have their merits—it is for each gardener to select the kind that seems best for his purpose. It is possible that he may not find dwarf sweet peas quite satisfactory. In

FIG. 11.—Pot of Soil prepared for fine seeds.

pots they sometimes fail to flower, and never flower so well as in the open ground, where the roots can extend at greater length. Antirrhinums (snapdragons) are included because, though really perennials, they flower best in their first year, and are therefore usually treated as annuals.

If annuals are to yield a succession of flowers, the seed should be sown at intervals from the beginning of March to about the end of August. The soil at the top should be fine, smooth, and firm, but not hard. The roots of young seedlings cannot penetrate hard soil, and unless they are able to do so the plants will be stunted. Hence the importance of sharp sand to render the whole porous. If, however,

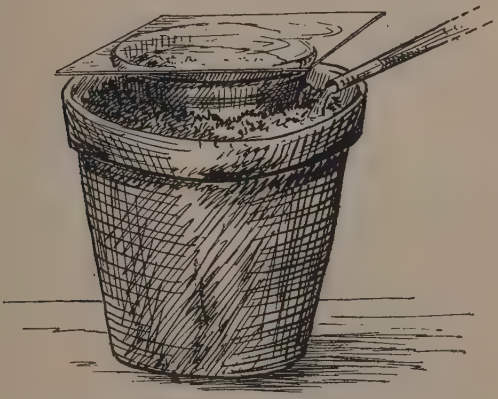


FIG. 12.—Pot containing Seed sunk in a larger one partly filled with moss, which can easily be kept moist.

the soil is not firm—if it is soft and spongy—it holds an excessive amount of moisture; and even when the plants escape serious injury, they make soft and sappy growth which is unfavourable to the production of flowers. Five or six seeds may be sown in a 3-in. pot (the measurement being the diameter at the top), and just covered with soil, which should be pressed down gently and then watered through a fine rose. A piece of glass should be laid over each pot in order to check evaporation, and on it, to exclude the light, some brown paper. It is the worst possible thing to keep on saturating soil which does not contain growing vegetation;

but if these precautions are taken, no watering may be necessary until germination commences, if then. At this stage, however, seeds are in a critical condition. A very short exposure to drought is sufficient to destroy them, and in order that they should never be dry, it is a good plan to put each pot inside a larger one lined with moss. If the moss is kept wet, the soil in the inner pot will remain moist for many weeks.

When the seeds are small, and especially when they are likely to be slow in germinating, the soil should be sterilised. This is early done by laying a piece of paper on the soil in each pot to prevent its being disturbed, and then pouring over it some boiling water until it runs freely out of the hole at the bottom. The boiling water will destroy all spores of moss, disease germs, seeds of weeds, and insects and their eggs, so trouble from these causes will be avoided. The pots should afterwards be left for a day or two to dry a little before sowing. If they are new, it may be necessary to mention that they should always be well soaked in water before they are used. Unless this precaution is taken, they abstract so much moisture from the soil put into them that it becomes dangerously dry in a very short time.

Even after the seedlings begin to appear, difficulties are not at an end; indeed, they rather increase. For as the glass must then be raised and some light admitted, the soil dries much more rapidly; and if it is moistened again by means of the water-can—even one with a very fine rose—tiny seedlings are sure to be knocked down by the spray, and will probably be destroyed. In such cases, the pots should be immersed for a few minutes up to nearly the level of the soil in a pail of water. Flooding must be avoided. As soon as the surface shows signs of darkening as the result of the rising water, the pots should be withdrawn. If then returned to the moss, they should not need watering again for a considerable time, provided, of course, that they are not exposed to strong sunshine.

Before the seedlings begin to crowd one another, two or three of the strongest should be selected, and the others

pulled out. If there is plenty of space for the selected plants, all may be allowed to grow; but in some cases it may be advisable a little later to reduce their number to one. It might seem better to do this at once, but with small seedlings there is always a chance of accidents, so it is prudent to wait. When their roots have reached the outside of the soil and have matted round it, they should be transferred to 4½-in. pots. As a rule, pots of a larger size are

FIG. 13.—When pots in a window are thus protected from the direct rays of the sun, the roots are less liable to be injured.

not wanted in a room, and if or when the soil again becomes filled with roots, the additional food required should be provided by means of a fertiliser. If, for the sake of convenience, the plants are kept in the original pots, they should be treated in the same way.

Annuals must be kept as near the light as possible, and should have plenty of air. If they can be grown outside until they reach the flowering stage, they will be much sturdier than in a room. If they are fairly hardy, this is generally easy to manage in spring, summer, and early autumn; but even in winter they will be benefited by being

placed outside during the day in mild weather. While the roots are few and short especial care in watering is necessary; but when they have permeated the whole soil, the chief danger in summer is excessive heat and drought, the delicate rootlets in contact with the pots being liable to be dried up and killed. A sufficient supply of water will prevent this, but at the same time the pots themselves should be exposed as little as possible to the burning rays of the sun. If they are in a window, some green tissue paper can be arranged round as a protection. Pot-covers can be obtained which serve the same purpose, or each pot can be placed in a bowl.

CHAPTER IV

HERBACEOUS FLOWERING PLANTS IN POTS

The classification of plants is not as simple as it might seem to be. The different classes merge into one another so gradually that there must be a good deal of overlapping. For instance, the ordinary definition of an annual is a plant which in the same year grows from seed, flowers, and dies, yet if it is raised comparatively late in the season it does not flower until the following year, in which case it practically becomes a biennial. Again, many annuals and biennials will, under favourable conditions, continue to live and flower for several years, and may then be regarded as perennials. There is the same difficulty about drawing a hard-and-fast line around herbaceous plants. They are, according to the dictionary, those which are "not shrubby in habit," and according to the same authority, a shrub is a "low, woody-stemmed perennial"; yet many plants which might thus be called shrubs —for example, *Alyssum saxatile*—would be found in most lists of herbaceous perennials. The present chapter deals briefly with perennials which are more or less soft-stemmed, but it is quite possible that some which may be looked for will be found elsewhere. (See Index at the end.) Two or three genera with shrubby as well as herbaceous species are included.

The majority of herbaceous perennials can be raised from seed without much difficulty, but as they often do not flower for two or three years, much time may be saved by starting with established plants. The most suitable kinds for pots are arranged below in alphabetical order, and any special points in connection with their cultivation are mentioned.

Agathæa cœlestis (Blue Marguerite).—A pretty pot-plant, which should be treated in the same manner as a cineraria. See also **Chrysanthemum frutescens**.

Anthericum.—The two best species are *A. liliastrum* (St Bruno's lily) and *A. liliago* (St Bernard's lily). The flowers of both are white, those of the former being the larger,

FIG. 14.—Anthericum liliastrum—a plantlet layered in a pot.

and distinguished by a green spot on each segment. They are well-known border plants, but are also very fine as pot-plants. They do not require artificial heat. In good soil, with plenty of water, they grow rapidly in summer; even in winter they should not be dried off. When they get too large they can be divided. They can also be propagated by pegging down in small pots the plantlets which are formed on the long stalks after flowering. Bought seed is sometimes disappointing, but if it can be procured as soon as it is

ripe, it usually germinates well. The plant sometimes called *A. variegatum* is really *Chlorophytum elatum variegatum* (see p. 120).

Auricula.—This is a species of primula, its botanical name being *P. auricula*, but among gardeners it is spoken of merely as auricula. There are several classes, such as Show, and Border or Alpine. The former, which is characterised by a mealy powder (technically known as paste) on the leaves and flowers, is again divided into green-edged, grey-edged, white-edged, and selfs. The Border or Alpine varieties are the hardier, and the easier to manage. They are of nearly all colours. The seed germinates much sooner and much more regularly if it is sown as soon as it is ripe. When it is held over until the following March, some of it may lie dormant for months. It should be sown in pots or boxes of very light, firm soil, and should be treated as advised for annuals. Before the seedlings begin to crowd one another they should be transferred separately to small pots, which should not be exposed to strong sunshine. If the stems are buried, they are almost certain to decay when in contact with damp soil. Only the base from which the roots spring should be below the surface. During the summer a north aspect is the most suitable. The plants should not be allowed to get quite dry at any time; but, of course, they need very much less water in winter than in spring, when they are growing. At the commencement of the growing period some of the old top soil should be removed and replaced by fresh, rich soil, and, if additional plants are wanted, any rooted offsets may be taken off and potted separately. An artificial fertiliser will benefit them when they show their flower-buds. The chief pests of auriculas are greenfly (aphis), and a mealy louse which attacks the roots (see illustration of Maidenhair Fern, p. 23), while there is a fungoid disease which causes the lower part of the stem and the roots to decay. Greenfly can be destroyed by sponging with any of the insecticides on the market—strong soap suds will do—and afterwards washing it off with clean water; vaporite will get rid of the mealy louse; and for the fungoid disease, the removal of the decayed

parts with a sharp knife and the application of quicklime to the wounds is recommended.

Calceolaria.—The shrubby species, of which there are many fine varieties, are usually propagated by means of cuttings inserted in sandy soil and placed in frames, which are kept close and shaded until roots are formed. The young plants are then potted, wintered where they will be safe from frost, but with as little artificial heat as possible, and kept fairly dry. When they begin to grow they need more water, and they should be "stopped" two or three times to make them bushy. They should be moved into larger pots when they require more space, and as the additional soil will provide all the food they want for a time, it is best not to give an artificial fertiliser until the flower-buds appear. They are generally propagated annually, young plants being more floriferous than old ones. The herbaceous calceolarias, which are such a feature of flower shows in spring, are all hybrids. They should be cultivated in the same way as cinerarias (p. 38). Calceolarias, like cinerarias, are very liable to be infested with aphides, especially if they are mismanaged. It is easier to prevent an attack by sponging or vaporising than it is to get rid of the insects after they have firmly established themselves on the plants.

Campanula.—The species most commonly grown in pots are *C. pyramidalis* (too tall for most rooms, but suitable for a hall) and either the blue or the white form of *C. isophylla* (a trailer, excellent for hanging baskets). But there are many others which may be used ; for instance, *C. balchiniana*, *C. cæspitosa* (which flowers throughout the spring), *C. carpatica*, *C. fragilis*, and *C. pusilla*. They can be raised from seed, as described for auriculas. The simplest and quickest method of propagation is by means of cuttings. Young shoots, preferably from the base, should be taken off in spring at a joint, and after the lower leaves have been removed—those which would be in contact with the soil, and would therefore be liable to start decay—should be inserted in moist sandy soil and kept shaded and close (that is, away from air currents). Roots are formed sooner near the side

FIG. 15.—Three Campanulas: *C. isophylla* (in Hanging Basket); *C. pyramidalis* (left); and *C. carpatica* (right).

of a pot than in the centre, because air is necessary for their development and, of course, more of it reaches them there, as also more water. When growth commences, the young plants can be taken up with as much soil as possible adhering to the roots, and potted separately. Campanulas are not troubled by many pests. A fungoid disease sometimes causes black spots in radiating lines on the foliage, and certain mites, too small to be seen with the naked eye, distort the inflorescences of some species and prevent their colouring. For the former, the plants should be sprayed with a weak solution of permanganate of potash (the water only just tinged), and for the latter, with some good insecticide.

Chrysanthemum frutescens (Marguerite or Paris Daisy).—A very useful species, because its yellow or white flowers are freely produced throughout the season. Plenty of water is necessary, and also, to keep the plants growing and flowering, plenty of food. Their habit is shrubby, but as they deteriorate after the first year, it is usual to propagate them annually. With this object they should be cut back after flowering, and the young shoots which start up from the base should be used as cuttings. Seeds may also be sown in the greenhouse in early spring. White sinuous marks on the leaves are often caused by the burrowings of a small maggot, the larva of a fly which also attacks Japanese chrysanthemums. Injured leaves should be taken off and burned. Spraying with a decoction of quassia chips will keep the flies away from the plants.

Cineraria. — There are a number of varieties—large flowered, cactus, and star—of many different colours. They flower so profusely that they are among the most popular of pot-plants. They are not difficult to grow from seed in a greenhouse, but anybody who has only a room for them had better get established plants. Though they do not require artificial heat, or at least only sufficient to protect them from frost, it is necessary to keep them growing steadily all the time. If growth is checked at any stage, whether by too much or too little moisture, too much or too little food, too much or too little heat, or by any other cause, they are

certain to become infested with greenfly, and, if they are not to be spoiled, they must be frequently sprayed with an

FIG. 16.—Chrysanthemum frutescens cut down to induce young shoots to grow from the base. A shoot prepared as a cutting.

insecticide. Vaporisation is more effective, but requires a greenhouse or a frame; in a room it is impossible. As cinerarias deteriorate after their first year, they are often treated as annuals. If they are wanted for a second year,

they should be cut down as soon as the flowers wither. This should also be done if it is desired to propagate them otherwise than by seed, as the young shoots which grow from the base make the best cuttings. If preferred, each may be divided with a sharp knife into a number of different plants.

Dielytra (or Dicentra), popularly known as the Bleeding Heart. There are three species which are often grown in pots—*D. spectabilis*, the commonest, from 1 to 2 ft. high, with crimson flowers; *D. eximia*, 1 ft. in height, purplish-red; and *D. formosa*, very similar to the last, but only half the height, bright red. An abundant supply of water, with a fertiliser occasionally, should be given during the period of growth. It should be gradually reduced when the foliage begins to change colour, and, after the tops have died down, the soil should only be slightly moist. If repotting is necessary, this can be done in spring. Dielytras, like many other plants, are not improved by being grown continuously in pots. If it can be managed, it is a good plan to have a number in the open ground and to lift a few each year, returning them to the garden after they have finished flowering.

Francoa ramosa (Bridal Wreath).—Small white flowers arranged on stems about 2 ft. in height. There are two other species which are worth growing—*F. appendiculata* (with pale red flowers) and *F. sonchifolia* (pink, blotched with red). All three can easily be grown from seed, and when the plants are too large for their pots they can be divided. They flower in July. They are most satisfactory in a slightly shaded position and, though natives of Chile, are nearly hardy.

Helleborus niger (Christmas Rose).—White flowers with yellow anthers in winter, but rarely opening as early as Christmas. There are several varieties, one of them with a white edging to the leaves. In the open ground the flowers are soon spoiled by snow and rain, but they last a very long time if, when the buds begin to expand, the plants are potted with as little disturbance of the roots as possible, and brought into a room. Afterwards they should be planted out again.

It is better to grow them in this way than to keep them in pots all the time. They can be propagated by division in March. Seeds often take a year or more to germinate.

Helxine solierolii.—A little mossy trailing evergreen plant, with tiny pinkish flowers. It is often used for growing around taller plants. If kept moist and not allowed to be burnt up by hot sunshine, it quickly spreads, covering the whole soil and creeping down the pots.

Lobelia.—The dwarf varieties of *L. erinus* are largely used for summer bedding and also for window-boxes, and the looser growing varieties, such as *L. speciosa*, for hanging baskets. They are best propagated every year, either by seed sown early in spring, by cuttings, or by division. There are also some very fine tall species, notably *L. cardinalis* and *L. splendens*, both scarlet. They can easily be increased by cuttings or division of the crowns. They should be planted in rich soil, and kept well supplied with water while they are growing. In winter they should be fairly dry.

Marguerite.—See **Agathæa cœlestis** (p. 34) and **Chrysanthemum frutescens** (p. 38).

Ophiopogon (Snake's Beard).—There are three species—*O. jaburan* (with white or blue flowers), *O. intermedius* (lilac), and *O. japonicus* (white). There is a variegated form of each. They are sometimes called Japanese hyacinths, which will indicate their habit of growth, though they are not bulbous. In fairly light soil they are good pot-plants, and the variegated forms with leaves striped yellow or white are very effective even when there are no flowers.

Polyanthus.—See **Primula**; also p. 85.

Primula (Primrose).—The majority of primulas can be grown in pots, but the most popular species are *P. malacoides* (mauve), *P. kewensis* (yellow), *P. obconica*, *P. sinensis*, and *P. stellata*—the last three in many different colours. The seed should be sown in sandy soil in March, and the treatment should be the same as described for auriculas. The watering at all stages requires care. The soil should therefore be porous, but firm, and each pot should contain a layer of broken crocks for drainage. If

the plants are kept too wet, they are liable to decay at the collar. If at any time they are allowed to get excessively dry, they are almost sure to be infested with aphides (green-

FIG. 17.—Primula sinensis, soil heaped round the base to induce the plant to form rooted offsets.

fly), which are not easy to get rid of because of the difficulty of spraying underneath the leaves, where the insects congregate. It may be necessary to apply an insecticide with a brush. A fungoid disease sometimes causes white, brown-edged spots on the leaves. To prevent its spreading a very weak solution of permanganate of potash should be used. Primulas are best grown in partial shade. Their flowers will

last much longer if they are not exposed to the midday sun. The majority of species can be propagated by division of the crowns either in spring or early autumn. But *P. sinensis* and those of similar habit should be cut down after flowering, and kept fairly moist and warm, some of the soil being heaped up round the stems. When offsets grow as the result of this treatment, they should be partly severed in order to induce them to form roots; and when they have done so, they should be taken off and potted separately. They will flower much better than the old plants.

Salvia.—Several of the shrubby species make handsome pot-plants, especially *S. boliviana*, *S. fulgens*, *S. rutilans*, and *S. splendens*, all of them scarlet, the last flowering in winter. Natives of South America, they should not be exposed to frost. With them may be associated the herbaceous *S. patens*, which, though often grown outside in summer, should also be in the greenhouse in winter, and kept fairly dry until it begins to grow again in the following season. They can be propagated by seed or by cuttings taken in spring, and inserted in sandy soil in the greenhouse. Young plants flower much better than old ones. *S. splendens* should be treated in the same way as a Japanese chrysanthemum (p. 51). Salvias require a great deal of water, and as they soon exhaust the soil, additional food should be supplied to them by means of an artificial fertiliser.

Saxifraga (Saxifrage, Rockfoil).—A very large family, some species, like *S. hypnoides* (Dovedale Moss), forming mossy cushions covered with white, pink, or red flowers in spring; others, like *S. umbrosa* (London Pride), growing in rosettes; and others again with the foliage in the rosettes silvery or encrusted. They are mostly natives of the Alps and other mountainous districts, and as the encrusted species are always found where limestone is plentiful, pieces of this stone should, if possible, be mixed with the soil. Indeed, this is a good plan to adopt with all saxifrages, as the stone absorbs water and keeps the roots cool and moist. Partial shade is the most suitable position for them. The mossy species are liable to be burnt up if they are exposed to strong

sunshine in summer, especially if they are allowed to get dry. Some species, such as London Pride, will grow and flower quite well in the shade. Growing naturally on the slopes of mountains, where they are kept dry by a covering of snow in winter, and where water quickly drains away, saxifrages are not used to damp, and are soon injured by it when the temperature is low. This is especially true of the encrusted species, which generally grow outwards from the face of a cliff, so that no water can lodge in the rosettes and cause decay in the crowns. Therefore, if they need moisture in winter, the water should be poured on the soil and not over the foliage. Propagation can be effected by seed (but growth is generally slow), or by division, or by cuttings.

Sedum (Stonecrop).—Another large family, varying greatly in the characters of the different species, from the little creeping evergreen Wall Pepper (*S. acre*), which is a common plant on walls in England, to the large herbaceous *S. maximum*, which is sometimes 3 ft. in height. As sedums grow in drier and warmer positions than saxifrages, many of them are more easily managed in pots. Some of the best species are *S. acre aureum* (the yellow-tipped variety of the common Wall Pepper), *S. album*, *S. anglicum* (another native), *S. asiaticum*, *S. brevifolium* (Mealy Stonecrop, so-called from the white globules on the leaves), *S. kamtschaticum variegatum* (with yellow flowers and variegated foliage), *S. pulchellum* (a fine trailing species), and *S. spectabile* (a handsome plant with pink flowers in September, sometimes 2 ft. high). They can all be propagated by seed, by division, or by cuttings in spring. If the little stems of Wall Pepper and similar species are chopped up, strewn on the surface of a pot of sandy soil, sprinkled with sand and kept moist, almost every piece will grow.

Spiræa.—The proper name of the plants commonly grown in pots is *Astilbe japonica*, but as they are popularly known as spiræas, they are placed in this list. There are, however, several true spiræas, such as *S. palmata* and its varieties, which are very ornamental in pots; and there are a number of beautiful hybrids, for instance Queen Alexandra

(pale rose) and Snow Plume (pure white). Spiræas and astilbes are not difficult to grow from seed, but it takes several years for them to become strong flowering plants. They are

FIG. 18.—Spiræa in a saucer which can be kept full of water.

usually bought in pots just as they are coming into flower in spring, or else as clumps in autumn, when they should be planted in rich, light soil. When they begin to grow they need a great deal of water, for they are naturally bog plants.

This is one of the few cases in which the pots may be kept standing in saucers containing water while the plants are making their growth. They should not be neglected when they have finished flowering, but should be kept moist until the foliage begins to wither, when, as usual, the water supply should be reduced, but not cut off entirely. If they can be planted out in a shady and damp corner, so much the better. If it is desired to increase the stock, each clump can be divided in autumn into two or three pieces.

CHAPTER V

FLOWERING SHRUBS IN POTS

HARD-WOODED plants which are grown in pots for their foliage will be found elsewhere. The present chapter is concerned with those that are grown for the beauty of their flowers in spring or summer. Those that flower in winter are grouped in another chapter. There is necessarily some overlapping, but where there is any doubt it can easily be settled by a reference to the Index.

Flowering shrubs differ widely in their characters, but for all, firm potting is necessary. Loose soil not only is liable to hold an excessive amount of moisture, but also induces soft, sappy, long-jointed growth, a condition unfavourable to the production of flowers. As previously mentioned, too, richness of soil should be avoided, for it tends to cause excessive growth, and thus to delay or even to prevent flowering. If additional food is needed, it should not be given to plants of this class until the buds have been formed, and then it should be moderate in quantity. In order that it should not interfere with the ripening of the wood, it should be stopped some weeks before the usual season for the cessation of growth. At this season fresh air and sunshine are more than ever important.

The best time to prune shrubs is after the flowers wither, and before the new growth commences. Those that flower in spring form their buds at the end of the previous summer, and if they are not pruned until autumn, many of the flowers will be cut off. On the other hand, those that flower in summer should be pruned in autumn and not in spring. If it is done after they have begun to grow it will delay, if not

prevent, flowering. But in all cases there should be a definite reason for pruning. Sometimes it may be necessary to remove dead, worn-out, or weak wood, to shorten long and straggling growth, or to thin out shoots that are either badly placed or excessively numerous; or it may be that flowers are produced on the tips of the young wood, and that by shortening some of the older wood the number of the shoots, and therefore of flowers, can be increased. These are all good reasons for pruning, but to cut merely for the sake of cutting or from some vague idea that it is beneficial to shrubs, is almost certain to do harm.

Azaleas, ericas (heaths), rhododendrons, and other shrubs of similar habit are sometimes grouped in nurserymen's catalogues under the heading of American plants, a very misleading description, as they come from all over the world, the majority of heaths, for instance, being natives of the Cape, while several species grow wild in Britain. Unlike most plants, they thrive in acid soil and, as peat is acid, they are usually found where it occurs. It is not, however, essential for them. They will grow quite well in turfy loam and sand, with an admixture of leaf-mould or decomposed manure—rather more of the latter than usual. As lime neutralises acidity, it is injurious to plants of this class, and if there is much of it in the soil or in the water, may eventually kill them. Hard water should therefore never be given to them. Either rain water should be specially set apart for them, or if hard water from the tap must be used, it should first be boiled and allowed to cool. When the hardness is due to chalk (carbonate of calcium), a good deal will be rendered insoluble by the boiling.

Abutilon.—A genus of greenhouse evergreen plants belonging to the Mallow family, with pendent bell-shaped flowers of many beautiful shades of red and yellow as well as white. They grow rapidly, but dwarf plants can be obtained by striking cuttings in sandy soil in spring or autumn. They flower throughout the season and, if the temperature is not too low, also in winter. Firm potting in light, rich soil and plenty of water while they are growing are their chief require-

ments. They are rather liable to be infested by aphides, and should be sprayed with an insecticide at intervals, not merely as a remedy but also as a preventive. For scale, a brush dipped in paraffin emulsion should be used. The softer the foliage of a plant, the more susceptible it is to pests of various kinds: and as softness is caused by the close, moist, warm atmosphere of an ill-ventilated greenhouse, it is essential for health that as much fresh air as possible should be admitted at all times. Even then, if it can be managed, it is best to grow most plants outside during the summer, and to bring them in again before cold weather comes. The named varieties have not been "fixed"—that is, do not come true from seed—but from a small packet sown in spring many excellent plants can be raised, and most of them should flower in the following year.

Acacia.—The majority of species grow rather too rapidly for rooms, but several, such as *A. Drummondii* and *A. pulchella*, are dwarfer, and make fine pot-plants. If they get too large they can be propagated by means of cuttings of partly-ripened shoots taken off with a slight heel of older wood in summer, and inserted firmly in moist, sandy soil, and kept close and shaded. Seeds sown as soon as they are ripe germinate quickly. About May, when the plants have finished flowering, they should be cut back in order to make them bushy; and if they are stood outside during the summer, they will be all the better for it. They require plenty of water, and even in winter should not be allowed to get quite dry.

Azalea.—There are a number of different species, but the plants usually seen in this country are hybrids. Some, grouped under the name of Ghent azaleas, are hardy; others, known as Indian azaleas (hybrids of *A. indica*), are tender; others again, Chinese azaleas (hybrids of *A. sinensis*, often called *A. mollis*), require only protection from severe weather. It is not worth while trying to raise them from seed, they take so many years to reach flowering size; and as propagation by cuttings is also slow, it is the general practice to buy established plants. The flowers should be taken off as soon

as they wither, in order to divert the sap into the wood buds and start them into growth as soon as possible. Unless this is done it continues to pass into the seeds until they begin to ripen, with the probable result that the young shoots do not grow until so late in the season that they are not in a condition to flower in the following spring. This is also the most suitable time for repotting, before the new growth commences. Azaleas should not be pruned. If they are cut back to old hard wood, the new growth is so slow in starting that it does not ripen sufficiently to bear flowers. As previously stated, peat is not necessary; turf, loam, sand, and rich leaf-mould or decomposed manure will do instead. The soil should be made quite firm by means of a wooden rammer, and care should be taken that no vacant space is left between the pot and the old ball of soil. It should be kept moist at all seasons, but especially during growth. Azaleas should never be sunk in the soil; the base of each stem should be about level with the surface—little, if at all, below it. The surest way to kill them is to bury a considerable portion of the stem, and to keep the soil saturated with water. They will ripen their growth better, and therefore flower better, if during the summer they are stood out in the open air. The injurious effects of lime on this class of plant has been previously mentioned. Two pests are sometimes troublesome—thrips, a small, narrow, dark-coloured insect with four wings; and red spider, a microscopic reddish-brown insect, which increases rapidly in numbers on the lower side of the leaves and causes them to turn yellow, and drop. Both these pests are almost sure to appear if the plants are kept too dry. Frequent spraying with water is the best method of prevention. In the case of an attack, an insecticide should be added to the water. It is not advisable to give an artificial fertiliser to azaleas or other plants of the same class, because most ready-made fertilisers contain some form of lime. Leaf-mould will supply all the food that is necessary, but no harm will be done by applying a little weak soot-water occasionally when the buds are swelling.

Camellia.—There are several different species, but the

plants which are usually seen in greenhouses are all varieties of *C. japonica.* The flowers are a little stiff, for which reason camellias are not as popular as they once were; but they are very beautiful, and have a wonderful range of colour, while their evergreen foliage makes them effective throughout the year. They require a great deal of water, especially when in flower. If allowed to get dry, then they are sure to drop their buds. If a fertiliser is given to them, it should be very weak; they are better without any so long as they make satisfactory growth. They should not be repotted until it is absolutely necessary, as disturbance is liable to interfere with their flowering. In summer they should be frequently syringed, and at all times the leaves must be kept clean. In an excessively dry atmosphere they are liable to be attacked by red spider. Other pests are scale and mealy bug, which should be brushed off with an insecticide. Blotched leaves are sometimes caused by a fungoid disease, and should be taken off and burned. For black mould on the foliage the plants should be syringed with paraffin emulsion every few days until it is quite gone. Camellias can be propagated by means of cuttings of the current year's shoots taken off in August, and inserted in sandy soil in a shaded frame or greenhouse; but except for this purpose they should not be pruned.

Chrysanthemum (Japanese).—Cuttings of shoots from the base of old plants should be inserted in sandy soil in December or January. A greenhouse is the safest place for them. If they are in an unheated house they should be put in a box covered with glass; if in a cold frame, the light should be matted over as a protection against frost. When the cuttings are rooted they should be potted separately, and afterwards should be kept growing, being moved into larger pots when the roots require more space. The soil should be rich, porous, and firm. Up to the end of June the points of the shoots should be pinched off occasionally. During the summer the plants should be in the open air in a position shaded from the midday sun. They need a great deal of water—two or three times a day in hot weather—and when

the roots have filled the pots, a weak fertiliser should be given every few days. When the buds appear it may be advisable to thin them, but for decorative purposes the number of flowers is of more importance than individual size. The plants should be brought into the greenhouse before they are likely to be injured by frost—usually about the end of September. The chief pests are the chrysanthemum fly, aphides, mildew, and rust. The fly deposits its eggs on the leaves, and the tiny maggots, when hatched, bore their way inside and make whitish marks. The position of each insect can easily be seen, and it should be crushed. Badly marked leaves should be taken off and burned. Spraying the plants with water containing a dash of paraffin will keep the flies away. For aphides, soapy water or any other insecticide can be used, and for mildew or rust a weak solution of sulphide of potassium (liver of sulphur), not more than $\frac{1}{2}$ oz. in 1 gal. of water. Indoors, where this liquid would blacken paint, the worst leaves should be taken off and the others dusted, when damp, with flowers of sulphur. Chrysanthemums in small pots are often useful for rooms. They can be obtained by striking cuttings in March, or later.

Coronilla.—The two best species for pots are *C. glauca* and *C. viminalis*, the former with pea-shaped yellow flowers produced throughout the whole season, and the latter with pale red. They should be kept dwarf by pinching off the tops of the shoots when necessary, and must not be allowed to get dry. They can be propagated by seed or by cuttings in spring.

Correa.—A genus of shrubs with red or white tubular flowers. They should be treated in much the same way as azaleas, except that, after flowering, the shoots should be shortened. In warm weather they should be frequently sprayed.

Cytisus.—The plant commonly grown in pots under the name of genista is really *C. racemosus*. Another fine species is *C. Ardoini*. There are also some beautiful hybrids or varieties, notably *C. Andreanus* (crimson and yellow) and *C. kewensis* (cream). In order to keep them in good shape

and of a size suitable for pots, they should be pruned as soon as the flowers wither—cut back in order to make them bushy. If they are afterwards sprayed occasionally the

FIG. 19.—Flowers of Correa.

young growth will soon start, and if necessary they can then be repotted. They can be propagated by cuttings of the young wood taken off when they are 3 or 4 in. in length and inserted in sandy soil. About the middle of summer the

plants should be put outside for a few weeks to ripen their wood.

Deutzia.—The double form of *D. crenata*, the smaller *D. gracilis*, and the large-flowered *D. Lemoinei* all make excellent pot-plants for spring. Like many other shrubs they soon exhaust the soil, and as it is not possible to keep on moving them into larger pots, it is necessary to supply them with food. Even then it is advisable to change some of the soil every year. When they have finished flowering, therefore, before the new growth commences, they should be turned out of their pots and some of the old soil should be worked away with a pointed stick, after which they can be replaced in the same pots, if quite clean, with the addition of fresh, rich soil carefully rammed in so that there are no gaps. At the same time any old worn-out wood should be cut away, and any shoots which crowd one another should be thinned—pruned away completely, not shortened. If this is done towards the middle or end of the season it will mean loss of flowers. When additional plants are wanted, cuttings of partly ripened shoots can be struck in moist, sandy soil in autumn.

Diplacus glutinosus.—See **Mimulus glutinosus** (p. 59).

Epacris. — Handsome Australian and New Zealand shrubs, of which there are many varieties. They are not unlike ericas (heaths), though of stronger growth. They require the same treatment as plants of this class (see **Azalea**). They can be grown without artificial heat, and some of them flower in winter.

Erica (Heath). — There are between 400 and 500 species and a large number of varieties, some flowering early in the year and others late. For treatment, see **Azalea**. But while the flowering of the latter can be hastened by artificial heat, heaths should always be grown as cool as possible, though the tender species, mostly of Cape origin, must not be exposed to frost. Pruning cannot be recommended for any plants of this class, and when repotting becomes necessary, it should be done without disturbing

FIG. 20.—Deutzia removed from pot, some of the old soil being worked away with a pointed stick.

the roots. The injurious effect on them of lime has already been mentioned. Heaths are sometimes attacked by mildew.

FIG. 21.—Young Fuchsia, to be stopped as shown, or even lower, to make it bushy.

In that case it is best to carry them out into the air and spray them with a solution of fresh sulphide of potassium ($\frac{1}{2}$ oz. to 1 gal. of water).

Fuchsia.—These plants, when well managed, flower so profusely and for such a long time that they are great

favourites for pots. Their stalks, however, are so weak that they are peculiarly liable to bud-dropping, and if the growth is interfered with, this is certain to happen. For instance, if the soil is allowed to get very dry, the buds fall for much the same reason as leaves of deciduous trees fall in autumn; while if after a period of comparative drought the plants are deluged with water, the sudden stimulation may start rapid growth, with the result that any sap which previously passed into the flower-buds is diverted into the wood-buds. For the same reason care is necessary in giving artificial fertilisers. They should be dissolved in water, and the solution should be very weak. As named varieties do not come true from seed, they must be propagated by cuttings, which should be struck in autumn for early flowers, and in spring for late. Some varieties require a good deal of "stopping" (pinching off the tops of the shoots) to keep them bushy, but others branch naturally. Several of them have a drooping habit, and are suitable for hanging baskets. In winter, fuchsias should be fairly dry. When they start afresh in spring they require more moisture, and they should then be cut back to induce shoots to start near the stem, and not merely on the extremities of the shoots.

Genista.—See **Cytisus** (p. 52).

Geranium.—See **Pelargonium** (p. 62).

Heliotropium (Heliotrope).—The common sweet-scented species is *H. peruvianum* (Cherry Pie), of which there are many beautiful varieties. They can be grown in a greenhouse or a room, provided that they are protected from frost, and, when the temperature is low, kept fairly dry. They can be propagated by seed sown in heat in March, or by cuttings taken either in spring or in autumn. The young plants should be "stopped" two or three times to make them bushy.

Hydrangea.—Of the two species, *H. hortensis* (of which there are several varieties) and *H. paniculata grandiflora*, the former is the more common in pots, but the latter is also a very fine plant for this purpose. Both retain their flowers in good condition for an unusually long time. An enormous

FIG. 22.—Flowers of Hydrangea: *paniculata* (above), *H. hortensis* in a pot (below).

number of plants of *H. hortensis*, each with an immense head on a single stem, are grown for market every year. Cuttings of strong, well-ripened shoots are rooted in August or September, kept fairly dry and safe from frost, and potted in rich soil early in spring. The flowers are ordinarily pink, but they can be made blue by means of a little alum or sulphate of iron dissolved in water. Hydrangeas require a great deal of water in summer. They quickly flag if the soil gets dry. As soon as the flowers of *H. paniculata* wither, it should be cut back rather hard in order to induce the growth of strong young wood capable of bearing the new crop of flowers.

Lilac.—See **Syringa** (p. 65).

Mimulus glutinosus. — This shrubby mimulus was formerly called *Diplacus glutinosus*, a name still given to it in some catalogues. It owes its specific name, *glutinosus*, to the sticky exudation on the stems and stalks. The beautiful salmon or orange flowers are produced throughout the season. Like the rest of the genus, it requires a good deal of water in summer, though not as much as some of the herbaceous species. During hot weather a partially shaded position is more suitable than one fully exposed to sunshine. Propagation by cuttings or seed.

Myrtus (Myrtle).—There are several different species, but the ordinary one is *M. communis*. Foliage, flowers, and berries are all strongly scented. Not infrequently the plants, though perhaps carefully tended when in flower, are neglected afterwards, with the result that they fail to flower in the following season. They should be induced to make strong growth by frequent watering and spraying, and an occasional dose of fertiliser, and the growth should be ripened by exposure to sunshine and fresh air. As the foliage is evergreen, myrtles do not, like deciduous plants, have a period of complete rest in winter, and must therefore never be allowed to get dry. They are fairly hardy, but should not be exposed to severe frost. They should be syringed frequently to keep them clean, and if they are attacked by scale or red spider, the insects should be washed

off. Propagation can be effected by cuttings in spring and autumn.

Nerium Oleander (Oleander).—Some varieties are single

FIG. 23.—Nerium Oleander, flowers and shoot prepared as a cutting.

and others are double, the colours white or red or yellow of many different shades. The treatment should be the same as for the myrtle.

Nierembergia.—*N. frutescens* is a small hardy shrub which is sometimes grown in pots. Its pale blue tubular flowers, borne in early summer, are very effective. A more

FIG. 24.—Pelargonium Leaves: (1) show or fancy; (2) zonal; (3) ivy-leaved; and (4) scented-leaved.

slender species, *N. gracilis*, is excellent for hanging baskets. There is no difficulty about their cultivation. Both can be propagated by seed or cuttings.

Pelargonium.—This genus may be roughly divided into four classes—show or fancy, zonal (popularly known as geraniums), ivy-leaved, and scented-leaved. The majority of species are natives of the Cape, and are therefore more accustomed to periods of drought than plants which grow in moister climates. The show or fancy class is derived from *P. grandiflorum*; zonals are hybrids of *P. zonale*, the horse-shoe geranium, so called because of the dark horse-shoe zone on the foliage; the ivy-leaved varieties are hybrids of *P. peltatum*; and the scented-leaved of *P. quercifolium*, the oak-leaved geranium. Pelargoniums can easily be raised from seed, and will flower in the second year; but named varieties must be propagated by cuttings, partly ripened shoots taken off in August, or, for late flowers, in spring. When the cuttings are rooted they should be potted firmly in light, well-drained soil, and should be kept fairly dry in winter—when the temperature is low, quite dry. When growth commences they require more water, and they should be "stopped" once or twice to make them bushy. As young plants produce the finest flowers, it is a common practice to propagate pelargoniums afresh every year, and to throw the old plants away; but even if they are kept they should be cut back in August in order to induce new shoots to start lower down. There are no better plants for hanging baskets than ivy-leaved pelargoniums, not only because they are less injured by dryness than most others, but also because they flower so profusely. All classes of pelargoniums are remarkably free from disease, few pests attacking them. One of the commonest causes of ill-health among them is excessively deep planting.

Plumbago.—Of this genus the most suitable species for pots in an ordinary greenhouse is *P. capensis*, which has spikes of lavender-blue flowers towards the end of the summer. It really is a climber, but if propagated by cuttings in spring and kept dwarf—the soil should therefore be porous and rammed firm—it flowers well as a small bush. It should be

treated in the same way as a fuchsia. It flowers on the young wood and, in order to promote the growth of new shoots, should be pruned rather hard after the flowers wither.

Rhododendron.—The hybrids, of which there are many beautiful varieties, are more numerous than the original species. Some are quite hardy, but others require protection in winter. For cultivation, see **Azalea** (p. 49).

Rose.—Though roses are often grown in pots, they are by no means the easiest of plants to manage, partly because of the many pests by which they are attacked. As the vigorous growth which is desirable in the open ground is rather a disadvantage in pots, it is not unusual to have them on their own roots, and with this object cuttings of young ripened wood may be inserted firmly in sandy soil and in a shady position in October. A year later those that have rooted may be potted. The pots should be placed in a greenhouse or in a cold frame. If in the latter, they should be protected during frost by mats or sacking. The soil should not be allowed to get dry, but as it is important to avoid excessive damp, any watering should be carefully done, and fresh air should be admitted on sunny mornings. In February the plants should be pruned. As the aim should be merely to produce a good head, and not greatly to reduce the number of flowers, a little shortening and possibly some slight thinning will be all that is necessary. When growth commences plenty of fresh air is essential if an attack of mildew is to be avoided. An occasional spraying with a weak solution of permanganate of potash is an excellent preventive. If aphides appear on the plants, an insecticide should be used at once. They multiply so rapidly that they are difficult to get rid of unless measures are taken at the outset. The foliage should be examined frequently for grubs, and any noticed should be picked off. As soon as the buds can be seen a weak fertiliser may be applied every few days, and after flowering the plants should be cut back. They should remain under cover until the weather gets warm, when they will do better outside, preferably plunged in the ground so that their pots are

FIG. 25.—Philadelphus, commonly called Syringa (top); the real Syringa, commonly called the Lilac (bottom).

not exposed to the sunshine. They must be kept watered. In October they may be brought inside again.

Syringa (Lilac).—The proper name of the plant popularly known as the syringa is Philadelphus; the real syringa is what is commonly called the lilac. It is important to remember this when ordering from a nurseryman. There are many fine varieties—*Alba grandiflora* (large white, single), Alphonse Lavallee (blue, double), Charles X. (large purple, single), Lemoinei (pale lilac, double), and others. They can be forced into flower considerably before their usual time, and the process is helped by immersing the plants (the branches, not the roots) for a few minutes in hot water. When forced, the coloured varieties usually produce white flowers. This always happens if they are grown in the dark. After having been forced, lilacs should be planted outside for a couple of years before they are potted again, and even when they are not subjected to artificial heat it is better to put them outside after flowering. They can be propagated by cuttings or, unless they are grafted, by suckers, which are often numerous. Several fungoid diseases sometimes cause spots on the leaves, but they are not serious. The whitish marks, not infrequently seen on them, are due to the grubs of a tiny moth which tunnel inside the leaves in the same way as those of the chrysanthemum fly. Such leaves should be taken off and burned. Pruning should be confined to trimming out young shoots likely to crowd one another, and the removal of suckers.

CHAPTER VI

WINTER-FLOWERING PLANTS

FLOWERS in winter are largely a matter of temperature. Very few plants will flower in the open air at that season in England, but many will do so in a greenhouse, and some even in a room which is warmed during the day by means of a fire. To them the rule as regards dryness cannot be applied. As they are making growth—floral growth, if not foliage and stems—they are using water, and water must be supplied to them. But it must be strictly moderate in quantity. It is almost better to wait for a slight flagging of the foliage—though this is not recommended—than to keep the soil saturated. The mortality due directly and indirectly to excessive damp in winter is probably greater than that from all other causes put together.

A muggy atmosphere is just as bad as saturated soil. If it prevails outside nothing is gained by letting it in, but in bright weather the ventilators should always be open—at any rate in the morning—though not in such a way as to admit a keen east or north wind. Not infrequently greenhouses belonging to amateurs are kept closed all the winter. A visitor to a nursery on most days would find not only the ventilators but also the doors open, the plants in consequence being in a far more healthy condition. Their requirements at this season are fresh air, as much light as they can get, a moderate temperature, and just sufficient water to keep them going. The tin of artificial fertiliser should be laid on the shelf until strong growth recommences in spring.

The majority of bulbous plants are grouped in a chapter by themselves. Some of the shrubs and herbaceous perennials already mentioned flower in winter. Of the

FIG. 26.—Three Anemones: *A. coronaria* (top); *A. hepatica* (right); and *A. blanda* (bottom).

others, those most commonly grown in pots are dealt with here.

Anemone.—All the anemones can be grown in pots, the numerous forms of *A. coronaria* being specially beautiful. Several species, such as *A. blanda* and the varieties of *A. hortensis* and *A. hepatica* (often called merely *hepatica*), are excellent for winter flowers; while if the well-known Japanese anemone (*A. japonica*) is carefully lifted and potted in autumn, it will continue to flower for a long time in a greenhouse or in a room. The most suitable soil for anemones is rich sandy loam. They should be protected from frost, but not subjected to a high temperature. Their flowers last longest in partial shade. They require plenty of water while growing, less when the foliage begins to change colour, and little or none while they are resting. The woody crowns may be either left in the pots or else stored in sand to exclude the air and prevent their being dried excessively. Most species are best planted in autumn, but *A. coronaria* may also be planted in spring.

Begonia (Winter-Flowering).—There are several species which flower in winter, but the exceedingly floriferous and handsome plants usually grown are hybrids resulting from the crossing of the herbaceous *B. socotrana* with the tuberous *B. Dregei*. The first of the race thus obtained was Gloire de Lorraine, which is still one of the best. As old plants do not flower so well as young ones, they should be propagated every year. With this object they should be cut down nearly to the soil after the flowers wither, and should be kept fairly dry until young shoots start from the base, when the supply of water should be increased gradually. When the shoots are 2 or 3 in. in length they should be cut off at the points from which they spring, and should be inserted in pots of sandy soil and covered with glass or placed in a propagator. They should be kept moist, warm, and shaded until roots are formed and growth commences, and then should have more light and air—as much as possible during the summer. When the pots are filled with roots they should be moved into larger ones. They do not require a very high

temperature when growing, but it should not fall below 55° F. The leaves of these begonias are sometimes infested by a mite, and turn brown in consequence. The insects are

FIG. 27.—Flowers of Bouvardia, also shoot growing up from the base after the plant has been cut down.

so small that they can be seen only through a magnifying glass. To destroy them the plant should be sprayed with an insecticide.

Bouvardia.—There are many fine species and hybrids,

the latter being more generally grown. They are evergreen shrubs which are sometimes classed as stove plants, but they can be grown in a warm greenhouse and, while in flower, can be kept in a room. The flowers—white, pink, scarlet, crimson, yellow or orange, single or double—are abundantly produced in winter, and are very fragrant. After flowering, the plants should be dried slightly, and then cut back and syringed frequently to soften the bark and hasten the starting of the young shoots. These shoots can then be used as cuttings. Propagation can also be effected by root-cuttings —short lengths (about 1 in.) of the thicker roots laid on moist, sandy soil and only just covered with similar soil, and placed in the warmest part of the greenhouse, preferably over the hot-water pipes. When the little plants have made a few leaves they should be lifted and transferred to small pots. During the summer bouvardias can be planted outside, but should be repotted before frost. They should be pinched back at intervals up to about the middle of August to make them bushy and produce more shoots, on the tips of which the flowers are formed. Mealy bug (a species of scale), aphides, and red spider are often troublesome, the last especially if the plants are kept too dry. Soapy water or any of the ordinary insecticides should be used for getting rid of the pests.

Carnation (Perpetual, or Tree).—These winter-flowering carnations are of more vigorous growth than the ordinary border kinds, and from their upright habit cannot easily be layered like the latter, though this is sometimes managed by laying the pots on their sides. It is more usual to propagate them by cuttings of the young shoots taken off with a heel of old wood in autumn or early spring. They should be inserted, after the removal of the lower leaves, in sandy soil, and kept warm, moist, and shaded until they are rooted, when they should be potted very firmly and exposed gradually to light and air. In summer they require plenty of both. If any flower-buds appear at that time they should be cut off. The shoots should also be "stopped" once or twice to make them branch. In winter a temperature of 50° F., rising a little during the day, is quite high enough. The pests of carnations

FIG. 28.—Prepared Carnation cutting.

are rather numerous, and include aphides, thrips, red spider, earwigs, the grubs of the carnation fly, eelworms, and, among fungoid diseases, mildew, rust, and spot. For aphides, thrips, and red spider (a sure sign of excessive dryness) the plants should be syringed with an insecticide. Earwigs should be trapped in short lengths of hollow bamboo. Eelworms, too small to be seen with the naked eye, cause swellings on the stems, and eventually kill the plants, which, in the case of a bad attack, should therefore be burned. The soil also should not be used again or thrown away to infect the land, but should be sterilised by baking or by pouring formaldehyde over it. If sterilisation is performed before the soil is used for carnations (see p. 30), the trouble can be prevented. The grubs of the carnation fly cause white streaks in the leaves. The insect can be extracted with a pin, and if the plants are syringed with water containing a dash of paraffin, the flies will be kept away. For the fungoid diseases a weak solution of permanganate of potash may be used; but spot, characterised by pale rings on the leaves and stems, if allowed to develop as the result of unsuitable conditions, resists every known treatment and is almost sure to destroy the plants. In the case of an outbreak, therefore, it is better to sacrifice any that have been severely attacked. When the disease is only slight, a cure can sometimes be effected by removing the damaged leaves.

Chimonanthus fragrans.—A slender shrub which usually needs support, the flowers very fragrant. It is hardy enough to be grown in the open air, but the flowers last much longer when they are protected from the weather. As it flowers on the wood of the previous year, it should be cut back rather hard immediately after flowering in order to induce as many shoots to start as possible.

Chionodoxa.—See **Bulbs**, p. 136.

Chrysanthemum (Japanese).—See p. 51.

Coleus thyrsoideus.—A handsome species with blue flowers borne in winter in a warm greenhouse. When they are open the plants can be brought into a room. Propagation by seed and cuttings. See **Coleus**, p. 120.

FIG. 29.—Carnation pests: aphides (top); thrips (middle); red spider (bottom). All much enlarged.

Crocus.—See **Bulbs**, p. 136.

Cyclamen.—See **Bulbs**, p. 137.

Daphne.—The best winter-flowering species are *D. Mezereum* and *D. odora*, especially its variety Mazeli, the former a hardy deciduous shrub with red flowers, and the latter an evergreen, which is rather more tender and is usually grown in pots, though it may be planted out in summer. Both species, when intended for indoor use, should be potted early in autumn. If the operation is delayed, some of the young roots which they have already made will be injured, and the plants will not be so satisfactory. They should be grown fairly cool. Daphnes should not be pruned.

Hamamelis (Wych Hazel).—A genus containing three species—*H. arborea*, *H. japonica*, and *H. virginica* (the commonest)—remarkable for their strange, tattered-looking yellow flowers borne on the leafless branches in winter. They are quite hardy, but a striking effect can be produced by growing them in pots. They are often grafted, but can be propagated by layering. Pruning is not advisable.

Hibiscus.—There is one winter-flowering species, *H. marmoratus*, with rather long tubular white flowers mottled with pink. A native of Mexico, it requires a fairly high temperature, but given that it can be grown without much trouble. It should be cut back a little after flowering, and given less water until the new shoots start. The prunings may be used as cuttings. During the summer it may be kept in an airy greenhouse or put outside for a time. The other perennial species should be treated on the same lines.

Imantophyllum (or Clivia).—A South African genus with long, leathery, strap-shaped evergreen leaves and large heads of handsome yellow or orange flowers. *I. cyrtanthiflorum* and *I. Gardeni* flower in winter in a suitable temperature, the others in spring or summer. Like all plants of this class, imantophyllums should be heavily watered and frequently syringed in summer, but in winter the soil should be only slightly moist. When over-potted they do not flower so well; they should, therefore, not be moved until the large fleshy roots burst the pots, when they should be transferred without dis-

turbance of the soil to the next size larger, care being taken that the whole of the additional space is filled with fresh soil.

FIG. 30.—Imantophyllum cyrtanthiflorum.

Lily-of-the-Valley.—See **Convallaria majalis**, p. 81.

Iris.—There is one rhizomatous species which flowers in winter—*I. unguicularis*—and there are a number of bulbous

species—*I. alata*, *I. caucasica*, *I. histrio*, *I. persica*, and *I. reticularis*. In some districts they are hardy enough to grow outside, but as the buds may be spoiled by the weather, it is better to pick them and let them open in water indoors. If, however, they are grown in pots in the greenhouse, they are quite safe. The best season for planting the bulbous species is from August to October. *I. unguicularis*, of which there are several varieties, may be planted either then or in April. The soil for the former class should be rich loam, with about a quarter sharp sand; for the latter there should be less sand, and some old mortar should be used as drainage. Though irises require a good deal of water while they are growing, the supply should be reduced when they are ripening their growth, and they should be well baked in the sunshine. The warning against exposing the roots of most plants in pots to strong sunshine does not apply to these rhizomatous kinds. The bulbous irises may be dried off completely and, if desired, shaken out of the soil and repotted; but *I. unguicularis* should be kept slightly moister, and should not be disturbed until more space becomes necessary. See also p. 140.

Lonicera (Honeysuckle).—The evergreen bushy species, *L. fragrantissima*, bears its white flowers in February and March in the open air, and some weeks earlier in a greenhouse. It is very sweetly scented. In order to keep it of a convenient size for pots, it should be pruned back rather hard annually; but as it flowers on the wood of the previous year, the pruning should always be done after the flowers wither and before the new growth commences. If it is done later in the season it will involve a loss of flowers. Though the plants are hardy, it is not advisable to move them out of a warm greenhouse or room into the open air until the weather is fairly mild; but as the spring advances they will make better growth there than inside, and will ripen it better, always provided that the hot sunshine is not allowed to beat directly on the pots and to dry up the soil and injure the roots. This honeysuckle, like all the bush species, is most satisfactory when it is not pruned.

Salvia splendens.—See p. 43.

Saxifraga.—Saxifrages have been dealt with elsewhere. Several species are sometimes described as winter-flowering, but they more properly belong to spring. One of the earliest is *S. burseriana*, of which there are several beautiful hybrids. It sometimes flowers in February, but often not until March. For cultivation, see **Saxifraga**, p. 43.

Viburnum.—There are several species which are grown in pots—*V. opulus sterile* (guelder rose) and *V. tinus* (laurustinus). The latter especially is an excellent plant for the purpose, for it is evergreen, and if well managed—exposed to sunshine and fresh air in summer in order to ripen its growth—it flowers well in a small state and, if protected from frost, continues doing so throughout the winter, the dense heads of small white flowers and pink buds being very charming. Cuttings of the young shoots, taken off when they are nearly ripe, can be rooted in sandy soil without much difficulty. The guelder rose, being deciduous and quite hardy, should be rested in winter—kept fairly dry and cool. If it is planted out in the ground, or if the pots are sunk so that the roots are not too much exposed to frost, it may be left there until spring; but it will flower earlier if it is brought into a greenhouse. Crowded shoots should be thinned, but no shortening should be done.

Viola odorata (Violet).—When violets are to be grown in pots, either the most vigorous portions of the old crowns, or preferably strong, well-rooted runners, should be potted in April in rich loam, with a sprinkling of sand and at least 1 in. of broken crocks for drainage. The best position until about the middle of May is a shaded frame. During the summer they should be in the open air, but not where sunshine will reach them. They should be watered and sprayed frequently, and in due course transferred to larger pots. About the end of September they should be moved into the greenhouse or placed in a frame. All runners should be cut off at once, and a little weak manure may be given occasionally, especially after the buds appear. The worst pest is red spider, which is sure to attack the plants if at any time they are allowed to get dry. Hence the

importance of keeping the soil moist and of spraying during the summer. There are also several fungoid diseases which are sometimes troublesome. In their case spraying with a weak solution of permanganate of potash may be sufficient, but in a serious outbreak the affected plants should be burned in the hope of saving the others. It is of little use trying

FIG. 31.—Lifting a layered Violet runner with the trowel.

to grow violets in a room, because of the dust and other impurities in the air, as well as of the dryness; but they may be brought in when they are flowering. Among the best single varieties are La France, Princess of Wales, Victoria Regina (early), and White Czar; and among the doubles Comte de Brazza (white), de Parme, Marie Louise, and Neapolitan (of rather weak habit, but with fine lavender and white flowers).

CHAPTER VII

PLANTS GROWN FOR THEIR SCENT

It is not always easy to decide whether a plant is grown for the scent or for the beauty of its flowers. In some cases—for instance, mignonette and the rose Frau Karl Druschki—there can be no doubt; but others, such as sweet peas, present more difficulty. The question is complicated by the fact that while a plant may have a strong scent under certain conditions, it may under others have little or none. *Mathiola bicornis* loses during the hours of daylight the powerful perfume which it emits at night; hence its popular name, night-scented stock. This is true of many other plants. Indeed, there are few, if any, which are not more strongly scented after sunset than before.

This might suggest the idea that, to get the greatest benefit from them, they should be grown in the shade; but the majority are of tropical or subtropical origin. The scent which they emit at night seems to require for its elaboration heat and strong sunshine during the day. There are two British species of mignonette (*Reseda lutea* and *R. luteola*), but both are odourless. For fragrance we must go to the North African species, the cultivated mignonette, and it loses some of that quality when it is grown in comparatively cold weather and when it is sown outside, say, early in April instead of in May or June. Even violets are not exceptional. It is true that in very hot positions in summer they are certain to be infested with red spider unless they are kept moist—often a difficult matter—but it is a mistake to grow them entirely in the shade. They should be in full sunshine in autumn and winter.

Space does not allow of enumerating all the sweet-

scented plants that are suitable for pots, but those that follow are some of the most important.

Aloysia citriodora (Lemon-Scented Verbena).—The whole plant is fragrant, especially the leaves. It is a nearly hardy shrub which will live in the open air in a warm

FIG. 32.—Calycanthus floridus.

position in the southern counties. In a severe winter it may be cut down to the ground there by frost, but it is rarely killed, young shoots starting up from the base in spring. When grown in pots, therefore, it needs only the protection of a cold greenhouse or frame or of a room. As young plants make the most satisfactory growth, it is often

propagated annually—by means of cuttings of the shoots of the previous year taken off at a joint and inserted in sandy soil in March or April. They should be potted when rooted, "stopped" once or twice, and induced to grow strongly by means of plenty of water and occasional doses of liquid manure. Towards the end of the season, when growth slackens, they require drier conditions, and after the leaves fall the soil should be only slightly moist. As soon as the new growth starts in spring they should be cut back to make them bushy.

Bouvardia.—See p. 69.

Calycanthus (Allspice).—The two best species are *C. floridus* and *C. occidentalis*. Both are deciduous, the flowers purple or red. They require the ordinary treatment for shrubs in pots. Pruning is not recommended unless it is necessary to remove a straggling shoot.

Carnation.—See p. 70.

Chimonanthus fragrans.—See p. 72.

Choisya ternata.—An evergreen shrub with white flowers in July. It is nearly hardy, and in the south can be grown outside in a sheltered corner. When in a pot, it should be put out after flowering to ripen its wood. Cuttings can be rooted in spring, but except for this purpose it should not be pruned.

Convallaria majalis (Lily-of-the-Valley). — The name suggests the requirements of this charming plant, for in valleys we expect shade and shelter, abundant moisture, and rich soil. For pots, if crowns have to be purchased, those that are three years old should be ordered. If they are only two years old they will flower poorly, and if one year, not at all. When clumps are lifted from the open ground the largest and plumpest crowns should be picked out for use. They should be planted rather closely from autumn until spring, according to the time at which they are wanted to flower, the tips rather above the surface, and covered with moss or fibre to exclude the light. It is a good plan to pack the pots in a box lined with moss. If the box is supported on bricks placed on the heated pipes in a green-

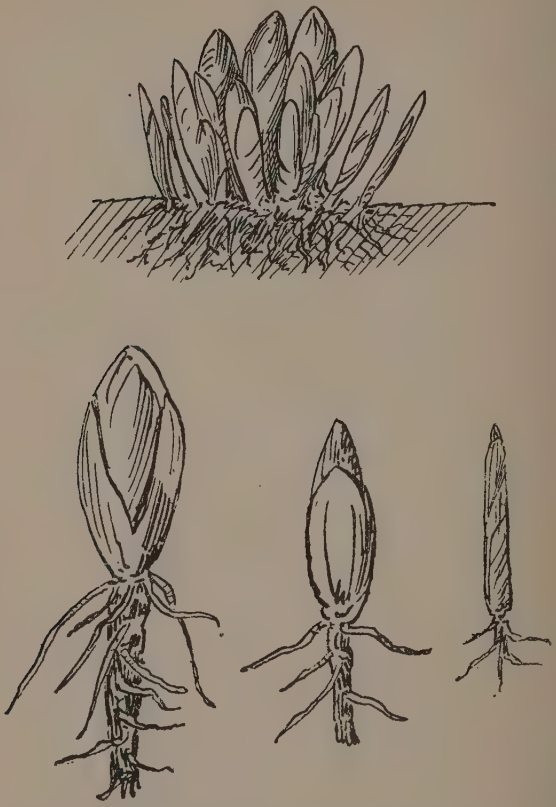


FIG. 33.—A clump of Lily-of-the-Valley Crowns; also separate Crowns, three year, two year, and one year old.

house, and the soil is kept drenched with warm water, flowers can be obtained in a few weeks. Of course in a lower temperature the process is slower, but even then plenty of moisture is essential. Fresh crowns should be potted every year.

Freesia.—See p. 138.

Geranium (Scented-Leaved).—See **Pelargonium**, p. 62.

Heliotrope.—See **Heliotropium**, p. 57.

Hyacinth.—See p. 139.

Lavandula vera (Lavender).—Though common enough in gardens, lavender is not often grown in pots, but there is no reason why it should not be. Apart from its pleasant fragrance, it is supposed to keep away flies, and should, therefore, be useful in a room. It needs a sunny position, but in other respects its cultivation presents no difficulties. It can be propagated by cuttings in autumn, or by seed.

Lilac.—See **Syringa**, p. 65.

Lonicera fragrantissima.—See p. 76.

Mathiola (Stock).—For cultivation of *M. bicornis* (night-scented stock), see **Annuals in Pots**, p. 27. Ten-week stocks (hybrids of *M. annua*) can be grown in the same way. The biennial kinds, such as the Brompton stocks (hybrids of *M. incana*), are generally sown in August and September, wintered in a cold frame or greenhouse, and kept fairly dry until growth commences in spring, when they need plenty of water and weak liquid manure.

Mignonette.—As the botanical name, *Reseda odorata*, is rarely used by gardeners, this deliciously scented annual is placed here under its popular name. As a rule, the object in growing it in pots is to make it flower in winter or in early spring, and for this purpose warmth is necessary. The soil should be firm and porous, and either bone meal or basic slag should be mixed with it, or else, as some form of lime is important, old mortar should be used as drainage instead of the usual broken crocks. Five or six seeds should be sown in pots of 3½ in., and the pots should be placed in a cold frame, which should be kept shaded and close. When the seedlings appear, both air and light must be admitted.

They should be thinned out to two or three of the strongest, growing well apart from one another. It may be advisable to reduce the number eventually to one, but in any case larger pots will be required as the plants grow. In October they should be brought into the greenhouse, and as the temperature falls, the supply of water should be reduced. With artificial heat (about 50° F. or rather more) flowers may be produced in winter, but in all probability they will not appear until spring. It is not generally known that mignonette, though ordinarily an annual, can be converted into a shrubby perennial by picking off all the flower-buds, as soon as they can be seen, for the first two years. It then acquires a woody stem and branches, and continues to live and flower for a number of years afterwards, provided, of course, that it is not exposed to too low a temperature.

Myrtus (Myrtle).—See p. 59.

Musk.—This is a species of mimulus (*M. moschatus*), and should be treated as described on p. 59. Plenty of water and shade from hot sunshine are its chief requirements.

Nicotiana affinis (Sweet-Scented Tobacco). — Should be grown as described for **Annuals in Pots**, p. 27. The flowers are white. There are a number of coloured hybrids, but they have little or no scent.

Osmanthus fragrans. — An evergreen shrub with starry white flowers in summer. It should be planted in firm, sandy loam, put outside to ripen its growth towards the end of summer, and kept fairly dry in winter. It is not quite hardy, but does not require artificial heat. As usual, autumn is the best time to root cuttings, but the less *O. fragrans* is pruned, the better.

Polyanthes tuberosa (Tuberose). — The botanical name is apt to be confused with polyanthus (many flowered); its derivation is quite different, for it really means white (*polios*) flowered. The popular name, on the other hand, may suggest some connection with the rose, whereas it is merely a form of tuberous. The small bulbs should be treated in the same way as freesias. A succession of flowers can be obtained by potting them at intervals. In order to

prevent their getting too tall they should be grown in full sunlight—in a greenhouse as close to the glass as possible. They rarely flower well a second year. There are double as well as single varieties.

Polyanthus.—Some of the yellow varieties have a very

Fig. 34.—Osmanthus fragrans.

delicious scent, and are very effective in pots. They are best grown in the open ground, and potted in autumn when they are large enough. The seed germinates most easily and rapidly if it is sown as soon as it is ripe. For cultivation, see **Primula**, p. 41.

Rose.—See p. 63.

Sweet Pea (Dwarf) and **Sweet Sultan.**—For cultivation, see **Annuals in Pots**, p. 27.

Tulip. — Several varieties are sweet scented, notably Yellow Prince. For cultivation, see p. 145.

Wallflower.—The double varieties are very fine, and last for a long time in flower, but for fragrance the singles are to be preferred. The seed may be sown in pots in May, and the seedlings treated as advised for mignonette; but the plants will be stronger if sown in the open ground, transplanted once or twice to prevent them making taproots (which could not be got into an ordinary sized pot and tend to make them tall instead of bushy), and potted in September. They should then be brought indoors, shaded for about a week, and then placed where they will have plenty of light and air. At all stages firm soil is necessary to keep their shoots hard and short jointed. As the result of excessive damp or any other condition unfavourable to growth, they are sometimes attacked by rot, a leaf disease resembling mildew. If it is merely a slight whitening of a leaf or two, spraying with a very weak solution of permanganate of potash may stop it; but if the shoots are damaged, the affected plants should be burned in order to prevent the infection of the others.

Violet.—See **Viola odorata**, p. 77.

CHAPTER VIII

PLANTS WITH ORNAMENTAL FRUITS

THERE are not many plants with ornamental fruits which are suitable for pots. The majority do not bear until they are too large for the purpose. Some of the best are given here. They have one great advantage for the decoration of greenhouses or rooms. The fruits generally last a good deal longer than flowers do, and they are not so liable to be injured by dust or other atmospheric impurities.

At the same time, it is easy to bring them down prematurely by mismanagement. It has already been mentioned that flowers and fruit are produced at the end of the cycle of growth, and though in the case of a few species the fruit may hang for many months—even until the flowers appear again—it drops in the case of most before the next cycle commences. If, therefore, growth is started by the stimulation of food or a high temperature, it is almost certain to bring down the fruit. Carelessness or neglect will have the same effect. The plants must be kept in a healthy condition. As they are not growing they do not want food or much water, but the soil must not be allowed to get dry.

Ardisia crenulata.—An exceedingly handsome evergreen shrub with bunches of purplish flowers in July, followed by beautiful coral berries, which with care remain on the plants for many months. If seed is sown in a warm greenhouse early in March, and the seedlings are potted as soon as they are large enough and grown on with plenty of moisture—syringed frequently in hot weather—they will flower and fruit the first year. When the plants are old they lose their lower leaves, and should then be cut down nearly to the soil in spring. In a suitable temperature they will soon grow again.

If desired, the shoots taken off can be used as cuttings. There are several other species with ornamental fruits, for

FIG. 35.—Cotoneaster Simonsii.

instance *A. macrocarpa* which has bright red berries; but *A. crenulata* is the easiest to manage, and on the whole the most effective. Scale is sometimes troublesome; it should be sponged off the leaves with soapy water as soon as it is noticed.

Callicarpa.—There are several species with violet berries. They are all evergreen shrubs. *C. purpurea* is perhaps the finest, but *C. americana* is more suitable for an ordinary greenhouse. The treatment is much the same as for ardisia.

Citrus (Orange).—There are a number of different species, but the plants usually grown belong to some variety of the ordinary sweet orange (*C. aurantium*). They can be raised from pips, but as they then take many years to reach the fruiting stage, they are almost invariably budded or grafted. They can also be propagated by cuttings. When well grown they are very handsome plants, with glossy evergreen foliage, and with fragrant white flowers and golden fruits, often with both together. As they increase in size they must be transferred to larger pots, and eventually, perhaps, to tubs. While they are making their growth they should be given weak liquid manure and plenty of water; later, when the wood is ripening, they should, as usual, be kept a little drier and placed outside, or else in a light and airy position in the greenhouse. At all times the foliage should be kept clean by spraying or syringing. The two most troublesome insects are red spider and scale, the former always attacking plants that have been kept too dry. Both can be washed off with soapy water, but the operation will probably have to be repeated more than once. The plants are sometimes disfigured by a black mould on the leaves. It can be got rid of by spraying several times at intervals of a few days with paraffin emulsion.

Cotoneaster.—Most species grow so rapidly that they soon become too large for pots, but as they flower and bear their scarlet berries while small they can be grown in pots for a time and then planted out. *C. thymifolia* is the smallest, an excellent little evergreen. *C. microphylla*, which is better known, is also evergreen. The common *C. Simonsii* is evergreen under glass, but generally loses its leaves outside in winter. Cotoneasters grow readily from seed, but do not flower for two or three years. They can also be propagated by cuttings or layers. The name is pronounced cot-o-ne-aster. It means resembling the quince (*Cydonia*).

FIG. 36.—Pernettya mucronata.

Cratægus (Hawthorn).—Many species can be grown in pots for their flowers, but the one with the finest fruits is *C. pyracantha*, the evergreen thorn, especially the variety Lelandi, which flowers when it is only a tiny plant. It is ornamental all the winter. All of them are rather slow growing, and should be obtained as established plants. They should be outside during the summer, but should be brought indoors before the fruits colour sufficiently to attract birds, which soon devour them. Seed germinates readily, but in order to save time it is better to propagate by means of cuttings, or grafts can be inserted on the common thorn.

Fuchsia procumbens.—See p. 99.

Pernettya.—The most useful species is *P. mucronata*, sometimes called the prickly heath. A native of the Straits of Magellan, it is quite hardy. There are many fine varieties with berries pink, scarlet, crimson, purple, and other colours, all of them very effective in autumn and winter. The genus is closely related to the heaths, and requires the same treatment (see **Erica**, p. 54). Like them, it should not be pruned.

Physalis (Winter Cherry).—The hardy species *P. Alkekengi* and the larger fruited *P. Franchetti* are common in gardens, and are often used in vases for winter decoration. More suitable for pots is *P. peruviana* (Cape gooseberry), of which there are at least two fine varieties—*edulis*, with yellow fruits which are sometimes eaten, and *violacea*, with violet fruits. They are of easy cultivation, and can be propagated by seed or by division. When they die down they should be kept fairly dry until they begin to grow again.

Rivina humilis (Bloodberry).—A small shrub which bears in winter great quantities of scarlet berries. It is easily managed in a warm greenhouse.

Skimmia japonica.—There are several varieties of this evergreen shrub, mostly with white fragrant flowers and bright red berries. It can be propagated by seed, or more quickly by cuttings. As is the case of all evergreens, cleanliness of foliage is important. Being quite hardy,

skimmias can be grown outside all the year round and the more they are in open air, the better; but when they are

FIG. 37.—Skimmia japonica.

in pots it is best to place them under cover at the approach of winter. They flower in spring. They should not be pruned.

Solanum.—The species commonly grown for their ornamental fruits are *S. capsicastrum* and *S. pseudocapsicastrum*

and their varieties. They are the most popular plants of their class, and are raised in enormous quantities for market every year. The easiest method is to strike cuttings in spring or to sow seed in March in a warm greenhouse. The young plants should be potted as soon as they are large enough, and grown in a warm atmosphere and a light position. To make them bushy, the tops of the shoots should be pinched off two or three times. They will then flower in summer, when weak liquid manure every few days will be beneficial, and in winter they will be covered with their scarlet berries. They are liable to be infested with aphides, and if they are then neglected the sticky fluid secreted by the insects becomes covered with a black fungus, giving the foliage a very objectionable appearance. Spraying at intervals with soapy water or any other insecticide will prevent the trouble or put an end to it. Young plants are the most satisfactory, but, of course, old ones can be grown into larger specimens. If they are brought into a room for decorative purposes, they should be returned to the greenhouse when they begin to get shabby; and in spring, as soon as the growth commences, they should be cut back rather hard in order to induce young shoots to start near the main stem. To assist this process by softening the bark, they should frequently be sprayed with warm water. After the buds break the plants may be repotted, some of the old soil being worked away with a pointed stick and fresh being substituted for it. The subsequent treatment should be the same as for young plants from seed.

Symphoricarpus racemosus (Snowberry). — This plant is usually allowed to grow in such a straggling manner outside that it may not seem to be very suitable for pots, yet there is one way in which it can be made very effective. If it is potted with as many of the underground stems as possible at any time during the winter in good loamy soil and cut down to the surface in early spring, it throws up a number of dwarf stems, which in summer are covered with charming little pink flowers, and in autumn with glistening white berries which remain all the winter.

CHAPTER IX

PLANTS FOR HANGING BASKETS

HANGING baskets are usually made of wire and lined with moss. In some cases the moss almost fills them, and plants in their pots are sunk in it; in others, its purpose is merely to contain the soil in which the planting is done. The former method has the advantage of enabling the plants to be removed easily and replaced by others when they have finished flowering; the latter allows of their having a larger quantity of soil, and so gives them a better chance of doing well, provided that they are kept sufficiently moist. That is the difficulty. In time the roots reach the outside of the soil, and as, except for a comparatively thin covering of moss which quickly dries, it is exposed to the light and air, it soon loses its moisture and, unless water is added, the extremities of the roots are killed. One thing is essential —the surface of the soil should slope from the outside towards the centre. If it slopes the other way—if it is even level—most of the water will run off instead of penetrating it and getting down to the roots. With every care, however, it is scarcely possible to moisten the whole of the soil by pouring water over it, especially if it has been allowed to get very dry. It is best, therefore, to take down all hanging baskets once or twice a week in summer and to immerse them for about five minutes in a pail of water.

The plants most suitable for this purpose are those which are either pendulous or else creeping or twining, but not of very vigorous habit. Ordinary climbers make so much growth that it is impossible to keep them within proper limits. Among the species enumerated some are annuals, others are herbaceous, perennials or bulbs, and a few are

shrubs. A number of ferns are grouped by themselves, as they require very similar treatment.

FIG. 38.—Achimenes in Hanging Basket.

Acacia.—*A. rotundifolia* and one or two other species, mostly with yellow flowers, are sometimes grown in hanging baskets. They are apt to get too large, and should be cut back immediately after flowering. For general cultivation, see p. 49.

Achimenes.—Charming little bulbous plants with funnel-shaped flowers of almost every colour. They should be grown in a greenhouse until they flower, when they can be brought into a room. They can be raised from seed sown in heat early in spring; or, if the tiny catkin-like tubers

FIG. 39.—Cactus in Hanging Basket, the pot embedded in moss.

are obtained, they should be planted with the thicker ends upwards, about 2 in. apart, in light, rich, well-drained soil, which should be kept only slightly moist until growth commences. If this is done at intervals, from the beginning of March to the end of May, it will provide a long succession of flowers, which will last longer if they are not exposed to strong sunshine. When the flowers wither, the plants should

be gradually dried off, and eventually kept quite dry. When they have died down, they may be taken out and stored in a bag of dry sand where they will be safe from frost; or they may remain in their pots on a greenhouse shelf until the following spring, when the tubers, considerably increased in number, should be taken out and re-potted.

Asparagus.—See **Foliage Plants**, p. 118.

Begonia.—There are a number of fine species and hybrids which are more or less pendulous, for instance *B. glaucophylla* and *Fleur de chrysanthème*. For cultivation, see p. 134.

Cactus.—There are many pendent or trailing species, which are best grown in hanging pots or baskets. They not only show to the best advantage in that way, but also are least liable to be injured. See p. 104.

Campanula.—The most popular species for hanging baskets are *C. isophylla* (blue or white) and *C. fragilis* (lilac); but there are others scarcely less suitable, such as *C. carpatica*, of which there are a number of fine varieties. For cultivation, see p. 36.

Dianthus.—Of this large family, one of the best for hanging baskets is *D. deltoides*, the Maiden Pink, especially the variety called Brilliant. It bears immense quantities of deep rose flowers in summer, and the shoots spread out forming a compact mat, which can be trained all over the moss and wire. Plants raised from seed sown in spring will flower in their second year. After they have flowered, it is best to put them out in the open ground without disturbing the roots, and to soak them with water. At the same time all the pods should be picked off.

Ferns.—Many ferns are, from their drooping habit, admirably adapted for hanging baskets, especially in a shady position. Strong sunshine is liable to injure the delicate fronds. Ferns need a good deal of moisture; but if this requirement is attended to there should be no difficulty in growing them, provided that the air is fairly warm and not too dry, and that the foliage is kept clean. Some of the smaller kinds, such as the *Adiantums*, can be arranged so

FIG. 40.—Fuchsia in Hanging Basket, the soil sloping from the sides towards the centre.

as to grow not only at the top, but also round the side, of a basket so that they will completely cover the moss and wire. Among the most suitable species for the purpose are *Adiantum capillus-veneris* (common Maidenhair, of which there are many varieties), *Asplenium flaccidum*, *A. lanceolatum*, *A. longissimum*, *Davallia canariensis* (Hare's-foot fern), *Nephrolepsis plumosa*, *Polypodium vulgare* (Adder's fern, many varieties), *Pellæa rotundifolia*, *Pteris serrulata* (Spider fern), and *Woodwardia radicans*. For general treatment, see **Ferns**, p. 122.

Fuchsia.—The pendent flowers are seen at their best in a hanging basket, and though the growth is sometimes too vigorous, there are many beautiful hybrids and varieties which are suitable for the purpose. There is also a New Zealand species, *F. procumbens*, with a creeping habit, which is especially effective in winter, for it then bears large reddish-purple berries. As fuchsias are very liable to drop their buds if the soil is allowed to become excessively dry, any hanging basket containing them should be taken down once a week in summer and immersed for a few minutes in a bucket of water. For cultivation, see p. 56.

Geranium (Ivy-Leaved).—See **Pelargonium**, p. 62. The most popular of all plants for the purpose. They are covered with magnificent flowers for months.

Linaria cymbalaria (Kenilworth Ivy, Mother-of-Thousands).—A hardy little perennial toadflax, sometimes seen on old walls in the South of England. Each plant soon becomes the centre of a colony, runners being thrown out in all directions. It bears tiny lilac flowers throughout the summer. Easily grown from seed, or propagated by means of the runners.

Lobelia.—See p. 41.

Lysimachia nummularia (Creeping Jenny, Moneywort).—A native plant with handsome yellow flowers throughout the greater part of the season. Growing naturally in damp pastures, it requires a good deal of water. Propagated by seed or by division.

Maurandia Barclayana.—A small greenhouse climber

with tubular purple or rose flowers in summer. As it is apt to grow rather tall, it should be trained round and round the

FIG. 41.—Maurandia in Hanging Basket, some of the shoots trained up the wires.

basket, some of the side shoots being allowed to ascend the wires. Propagated by seed in March or April, or by cuttings in August. The plants are not of much use in their second year.

Nasturtium.—See **Tropæolum**, p. 102.
Nierembergia gracilis.—See p. 60.
Othonna crassifolia.—A trailing perennial with fleshy

FIG. 42.—Saxifraga sarmentosa (Mother-of-Thousands) in Hanging Basket.

leaves and yellow flowers, easy to grow, but most satisfactory in a sunny position.

Saxifraga sarmentosa (Aaron's Beard and many other popular names, including Mother-of-Thousands, also applied to *Linaria cymbalaria*).—A well-known, half-hardy plant which is often seen in cottage windows. There are several forms

of it, the best (tricolour) having the foliage blotched with white and red. Its cultivation presents no difficulty if it is protected from frost. Some of the mossy saxifrages may also be used for covering the soil around taller plants, but they must not be exposed to strong sunshine in summer.

Sedum.—There are various species which are suitable for hanging baskets, among the best being the variegated form of *S. kamtschaticum* with yellow flowers, and *S. Ewersii* with pink flowers, both of them hardy evergreens with trailing stems. For cultivation, see p. 44.

Sibthorpia peregrina.—A trailing perennial with yellow flowers in June.

Thunbergia.—The best species for a hanging basket is *T. alata*, a very pretty annual with yellow and purple flowers. It is a native of the Cape. There are several varieties—*Alba* (white), *Aurantiaca* (deep yellow), and *Doddsii* (orange). Seed should be sown in a warm greenhouse in spring, and the seedlings potted in rich soil. In summer they may be brought into a room or even grown in the open air.

Torenia.—There are a number of different species, the best being the annual *T. asiatica*, which bears tubular blue flowers in summer. It should be treated in the same way as thunbergias.

Tropæolum.—Most of the members of this handsome family grow so tall that they cannot well be used in hanging baskets, but there are two perennial species, *T. polyphyllum* (yellow) and *T. tricolorum* (orange and black), which are of dwarfer habit. The former is hardy; the latter, which is much the most striking and has a much longer flowering season, requires greenhouse treatment. It has tuberous roots, and in winter, when it has died down, it should be kept dry until spring, when it should be repotted in fresh soil. The quickest way to propagate the perennial species is by means of cuttings. There are also many fine varieties of the dwarf form of the annual *T. majus*, commonly called nasturtium, and with these a gorgeous display may be made during the summer. They are, however, so strong in colour-

ing that care is needed in using them, as they deaden any other colour near them. Tropæolums, with the exception of *T. speciosum*, should have plenty of sunlight, and the soil should not be very rich or very moist, otherwise they tend to produce few flowers as compared with the amount of foliage.

Zebrina pendula.—This plant, which in some catalogues appears as *Tradescantia zebrina*, owes its name to the zebra-like white stripes on the green leaves and to its pendulous habit. It is grown for its foliage rather than for its flowers, but because of its common use as a basket plant it is included here. A native of Mexico, it is not hardy, and in winter it should be kept fairly warm, or at any rate safe from frost. In other respects it is easy to manage. It is sometimes employed to cover the soil in large pots or tubs. Cuttings can be struck at almost any time. Indeed, when the shoots lie on moist soil they usually emit roots at the joints, and can then be taken off and planted.

CHAPTER X

CACTUSES AND OTHER SUCCULENTS

THE name succulent is applied to plants with fleshy leaves or stems. If they are to be cultivated in a rational manner, it must first be understood how they came to acquire this character. They belong to many distinct genera, and are natives of many widely separated countries, mostly tropical; but in almost all cases they grow among rocks or in sandy deserts, where there is no shade from the heat of the sun and where, for the greater part of the year, there is no rainfall, and then perhaps for a short time an excessively heavy one. Obviously, no plants could exist under such conditions unless they were able to store some of the infrequent surplus and, like the camel in the animal kingdom, make use of it during the long periods of drought—make use of it, too, with the greatest economy. This is just what succulents can do. The cactuses will serve as an illustration. As the result of the long droughts to which they have been exposed for countless generations, their leaves have gradually dwindled away until now they are merely spines, and their functions have been taken over by the green stems, swollen by the absorption of much water during the periodical downpours, and able to part with their store only very slowly afterwards because of the comparative fewness of their stomata or pores and the thickness of their integument. In other genera which are exposed to less severe drought, the leaves, instead of dwindling, have become swollen, the thickening of the integument in their case also lessening the rate at which the water stored in them can escape.

Some of the succulents are natives of Britain; for instance,

the common stonecrop or wall pepper (*Sedum acre*) and the house-leek (*Sempervivum tectorum*), though the latter is probably only naturalised. They, of course, have not to endure tropical heat, but they grow in such positions that while much water may drain down upon them at times, they are liable to be dried up for a long period in summer, and the alternation has produced in them the same effect as in other plants of the same class in distant parts of the world, their leaves having become swollen and their stems thickened. From the abnormal conditions we might expect abnormal forms, and this is just what we find among the succulents. Many of them have no pretensions to beauty, and some are even grotesque. Yet all are interesting, and not a few have gorgeous flowers, not infrequently with a powerful perfume. As a rule, however, the flowers do not last long. They are so conspicuous that they can hardly fail to attract, almost immediately, the insects by which they are fertilised and, in consequence, the whole energies of the plants seem to have been concentrated on the task of increasing their attractive qualities rather than on that of strengthening them, as is necessary in the case of other species more likely to escape notice.

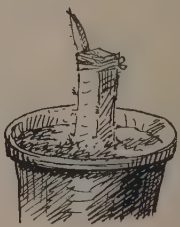
When we have learned the conditions under which plants grow in a wild state, we know how to cultivate them. What we have to do is to provide for them, as nearly as possible, the same conditions as those to which the race is accustomed. We must, therefore, supply the succulents in summer with great quantities of water, and in the winter keep them dry. The tropical species should be kept quite dry then, though if they show signs of shrivelling they may have, on a warm morning, a very little water in order to replace wastage. If, however, they are kept moist in a low temperature, they are sure to decay.

The soil should consist of fibrous loam and sharp sand in about equal quantities, the whole made quite firm, and as lime is important, a layer of mortar or lumps of chalk should be used as drainage. Artificial fertilisers are not necessary. If they are given, it should be only in very small amount

during the growing period, but not towards the end of it, as they might then cause growth at a time when it ought to be ripening.

There are no plants more easily propagated than succulents. Owing to the internal stores of food and water which they contain, almost every piece inserted in fairly dry, sandy

A small cutting tied to a stick to hold it firmly in the soil.



A grafted plant.

Fig. 43.—Propagation of Cacti.

soil will live and root. The cuttings should, however, first be laid on a shelf for a day or two to dry a little, as a good deal of sap exudes from the wounds where they are taken off, and the excessive moisture may set up decay. Any cutting that is very small should be tied with raffia to a short stick, which, when pushed into the soil, will hold it firmly in position. Grafting is another method of propagation. Many species also produce offsets, and these can be potted separately in spring.

Some of the most important succulents are as follows:—

FIG. 44.—Agave americana.

Agave.—There are many different species, the commonest being *A. americana* (sometimes called American aloe), which grows in a rosette of broad, long, green fleshy leaves with brown prickles along the edges. There are several

FIG. 45.—Cereus flagelliformis (Rat's-Tail Cactus).

varieties, one (*picta*) with yellow leaves edged with green, and another (*variegata*) with green edged with yellow. They are all handsome plants for the greenhouse. As they rarely flower while they are small, and then die, they are usually grown for their foliage alone. The name is pronounced A-gá-ve.

Aloe (pronounced Al-o-e).—A genus very similar to agave, and often confused with it. *A. variegata* is a popular pot-plant, and can be grown with little or no artificial heat. It is frequently seen in cottage windows. The leaves are smaller than those of *Agave americana*, and are mottled with white, and have a white edge with small teeth instead of prickles. Like all of the class, it should be kept nearly dry in winter.

Cereus.—A genus of cactuses with woody stems and very

FIG. 46.—Echeveria (Cotyledon), with offsets, which can be planted separately; also a leaf cutting.

handsome flowers of many different colours, many of them opening in the evening and collapsing before the morning. *C. grandiflorus* is one of the finest, and has a powerful perfume. In *C. nycticalus*, the Night-flowering cactus, they are larger, but scentless. *C. flagelliformis* (Rat's-tail cactus) is a common window plant, and well suited for hanging baskets.

Cotyledon (Navelwort).—In this genus *Echeveria* is now included. *C. atropurpurea* has red flowers; *C. metallica*, yellow and red flowers and metallic purple leaves; *C. fulgens*, coral flowers and pale green leaves; and *C. grandiflora*, orange flowers and mealy white leaves. *C. secunda*, under the name of *Echeveria secunda*, is largely used for summer

bedding. All of these can be grown in an ordinary greenhouse, provided that they are kept dry in winter. Some can be propagated by offsets, and others by cuttings. If neither is available, single leaves pulled off in autumn and inserted in dry soil in a warm greenhouse can be used. When small plants form at the base, the soil should be moistened slightly.

Crassula.—One of the commonest plants in cottage windows is *C. coccinea*, a shrub with heads of scarlet flowers in summer. With its fleshy green leaves and stems it is effective at all seasons; but probably one reason for its popularity and for that of many other species mentioned in this chapter is that, though they should be given a good deal of water during their growing period, they are not injured by neglect to the same extent as other plants. *C. falcata* (crimson), *C. jasminea* (white), and *C. lactea* (white, in winter) are other fine species.

Echeveria.—See **Cotyledon.**

Echinocactus.—The name, derived from *echinos* (hedgehog), suggests the multitude of spikes by which the plants of this genus are guarded. They are more or less globular in shape, the parent plant often densely surrounded by offsets. Among the finest are *E. corynodes* (yellow), *E. pectiniferus* (pale green, rose-tinted), and *E. rhodophthalmus* (rose).

Epiphyllum. — A genus of cactuses with flat stems. From the trailing habit they are suitable for hanging baskets. When not so grown they are often grafted on more upright stocks, such as *Pereskia*, in order to raise them above the pots. They have magnificent flowers which naturally open in winter. At that season, therefore, they should be in a warm greenhouse. Like all other cactuses, they should be kept dry from autumn until they start growth in spring; but if the temperature is high enough to enable them to flower, some small amount of water will be necessary. Of *E. truncatum*, the commonest species, there are many charming varieties.

Haworthia.—Very similar to aloe, but with shorter, thicker leaves. They require the same treatment.

Mammillaria.—The globular or cylindrical stems of this

cactus are covered with small tubercles (mammillæ) arranged in spirals, and externally terminating in spines. The flowers are mostly small, and have a wide range of colour—white, yellow, orange, pink, red, and purple. *M. clava* is the finest.

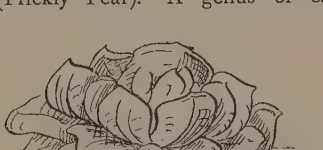
FIG. 47.—Mammillaria dolichocentra.

Mesembryanthemum (Fig Marigold).—A genus remarkable for its variety of widely different forms, many of them most extraordinary. Some, such as the *M. crystallinum* (Ice plant), are annuals, others perennials; some are deciduous shrubs, others evergreen; some might be mistaken for cactuses,

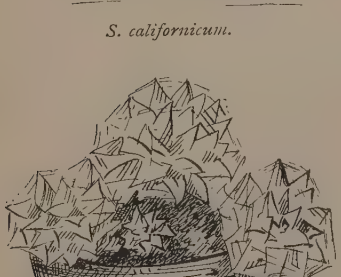
FIG. 48.—Mesembryanthemums: *M. testiculatum* (above); and *M. densum* (below).

others for other succulents; while not a few have struck out a distinct line for themselves. Most of the species have beautiful flowers, and require greenhouse treatment.

Opuntia (Prickly Pear).—A genus of cactuses with



S. californicum.



S. arachnoideum.

FIG. 49.—Sempervivums.

branched and jointed stems, some prostrate and others more or less erect. Two or three of them, such as *O. missouriensis* and *O. Rafinesquii*, are natives of North America, and in the South of England are sometimes grown in the open air throughout the year; but they require a warm and sheltered corner, and their hardiness depends on their being kept dry in

winter. They should therefore be planted on mounds of porous soil, and, if possible, a garden light should be supported over them before the autumn rains commence. This will show that they can be grown quite well in a room. The more tender species are best kept in a greenhouse until they flower, when they can be brought indoors.

Phyllocactus.—The name, derived from *phyllon*, a leaf, describes the leaf-like character of the flattened branches. The different species are often classed as stove plants, but they are often grown in a warm greenhouse. The flowers are mostly very large and very handsome, some of them also very sweet scented.

Sedum.—This genus is closely related to crassula. It was dealt with on p. 44.

Sempervivum (House-Leek).—Most of the species are hardy, but a few require rather warmer conditions, the best of the latter being *S. aureum* (yellow), *S. canariense* (white), and *S. tabulæformæ* (yellow). Not infrequently, however, the hardy species are also grown in pots, and some of them are very effective, especially *S. arachnoideum* (Cobweb house-leek) and its larger variety *Laggeri*, and *S. soboliferum* (Hen-and-chicken's house-leek). Sempervivums will grow in any light soil, provided that it is kept dry in winter. Some form of lime, such as old mortar, is beneficial, and for one species (*S. calcareum*) should not be omitted.

CHAPTER XI

FOLIAGE PLANTS IN POTS

Plants with handsome foliage have one obvious advantage over those with handsome flowers—they retain their decorative value for a much longer time, being effective throughout the season, and, if they are evergreen, throughout the year. This very fact, however, creates a difficulty, for it leads to a temptation to keep them month after month under unfavourable conditions, and often results in their being permanently spoiled. If they owe their attractiveness to their colour, it is almost sure to fade in the dry and dusty air of a gloomy room ; while if they are shrubs, they will probably lose their lower—that is, older—leaves, and this probability will become a certainty if they are neglected. Still, even then it may not be necessary to throw them away. If they are returned for a time to the greenhouse, and judiciously managed—perhaps pruned, and carefully watered and fed—they may recover ; though some, such as dracænas (cordylines) and indiarubber plants (*Ficus elastica*), may require more drastic treatment, for when once they have lost their lower leaves they do not regain them. In that case they should be renovated by a kind of layering. A nick should be made in the stem at a joint a little below the remaining leaves, and a small pot, split down the middle by a sharp blow of the trowel, should be fitted and tied round it, and then filled with sandy soil, which must be kept moist. Roots will issue from the wound, and when they are strong enough the rooted top should be cut off and planted in a larger pot. If preferred, a ball of moss may be tied round the wound instead of a split pot filled with soil ; but it also must be kept continuously moist, and this requires more attention.

FIG. 50.—Renovating a Dracæna (Cordyline).

The lower portion of the stem can be divided into portions, each containing about two joints, and used as cuttings. Even the base with the old roots may supply other plants, for in the warm, moist air of a greenhouse fresh shoots will probably come up through the soil.

The more permanent the foliage, the more necessary is careful cultivation. If a fuchsia loses a few leaves through mismanagement, no great harm is done; it has many to start with, and it can soon grow others, so bareness at the base is soon cured (except, perhaps, in the case of very old and worn-out specimens) by cutting back and causing new shoots to break. With such plants as *Ficus elastica* it is different. They naturally have very few leaves, and those few are meant to serve for many years. They do not make good their loss by means of new leaves on side shoots, like fuchsias, but remain bare afterwards. Any carelessness in their case is therefore irreparable. It is perfectly true that these plants with their thick, leathery leaves can endure drought better than others of more delicate texture, and are less likely to be injured by change of temperature, by dust, or other impurities of atmosphere, or even by want of food; but there is a limit, and the greater the distance from that limit, the longer they are likely to remain in a satisfactory condition. They should be given as much fresh air as possible whenever the weather will allow. They should be syringed frequently. Any insects noticed on them should be sponged off at once with an insecticide. They should be watered abundantly in summer, and given a weak fertiliser at intervals. In winter they should be kept drier, but never quite dry, for evergreens do not, like deciduous plants, have a complete rest at any season. They are therefore always using some water, though when the temperature is low it is not very much.

In the following list palms are grouped together under that heading, and ferns are treated in the same way. Agave and aloe will be found among the succulents.

Aralia.—A genus of handsome foliage plants. Some of the finest, such as *A. Ritchii*, require stove treatment, but others are nearly or quite hardy, among them being

A. chinensis, *A. racemosa*, and *A. leptophylla*. The plant popularly known as aralia is really *Fatsia japonica*. It should be treated in the same way. All species should be planted firmly in rich porous soil with a layer of broken crocks, and should be given plenty of water in summer. They can be propagated as described above, or by cuttings of the roots—short lengths inserted in sandy soil in a warm greenhouse.

Araucaria.—*A. imbricata*, the well-known monkey puzzle, is much too stiff to be graceful. *A. excelsa* (the Norfolk Island pine) and several other species are much better for pots. If neglected, they lose their lower branches and become unsightly, but with care they last for many years. They can all be grown in a cool greenhouse. They should be sprayed frequently to keep their foliage fresh and clean.

Asparagus.—The species most commonly grown are *A. plumosus* and its dwarf variety (*nanus*), and *A. Sprengeri*. They are good basket plants, and the feathery sprays are much used in bouquets. They grow most freely in a warm, moist atmosphere, and in a position in which they are shaded from the midday sun in summer. As the species mentioned are evergreen, they should not be dried off in winter, though they then need less water. While they are growing, liquid manure made by dissolving an artificial fertiliser in water should be given to them two or three times a week. When the plants get too large they can be divided in spring.

Aspidistra.—There is only one species in cultivation, *A. elatior*, but it and its white-striped variety (*variegata*) are perhaps the most popular of all room plants, partly because they are less injured by carelessness or neglect than any others. At the same time they respond readily to good treatment, growing very much finer when they are properly tended. In summer they can hardly be overwatered, and even in winter they should not be allowed to get dry. A little fertiliser may be given to them, but richness of soil is not desirable for the variegated form, as it tends to make the young leaves come entirely green. When the plants are kept too dry they are liable to be attacked by red spider,

the foliage then turning a sickly mottled colour. The remedy is, frequent spraying with soapy water and afterwards with clean water. Brown spots are sometimes caused by fungoid

FIG. 51.—Begonia Rex.

disease. They cannot, of course, be removed, but a very weak solution of permanganate of potash will prevent their spreading.

Begonia Rex.—The many hybrids and varieties of this species are grown not for their flowers, which are small, but for their magnificent foliage, which is most strikingly marked

and coloured. They require more moisture and more warmth than other begonias, and as the leaves are liable to be spoiled by strong sunshine, they should be shaded in summer. It will be seen that the conditions that suit them are those that suit tender ferns, with which they are often associated. They can be propagated by means of cuttings of the stems or of the leaves alone. Some of the older leaves should be taken off when they are ripened, cut across at different parts of the principal veins, and then pegged down flat on the surface of slightly moistened sand. In a warm greenhouse small plants will form at the cuts. When they are large enough they should be potted.

Carex (Sedge).—The best of the genus for pots is the variegated form of *C. tristachya*, often called *C. japonica*. The grass-like leaves are striped with white. It is hardy, and will grow in almost any kind of soil if it is supplied with plenty of water.

Chlorophytum elatum variegatum.—It appears in some catalogues under the name of *Anthericum variegatum*. It is grown for its grass-like leaves, striped with white, not for its flowers, which are small. See **Anthericum**, p. 35.

Coleus.—The beautiful plants which are so largely grown in pots or beds are hybrids. They can be raised from seed sown in spring in a warm greenhouse, but if it is desired to perpetuate any particular variety, this must be done by means of cuttings. The plants require a fairly high temperature in winter, and as they are almost sure to become shabby, it is best to propagate them annually. They need sunshine to bring out the full colour of their foliage, and for this reason they should not be kept in a room more than a few days at a time. Even when the position is a window, a change to the greenhouse will benefit them, if only because the air there contains less dust and more moisture. There is one species, *C. thyrsoideus*, which is grown for its flowers—blue flowers, produced in winter.

Cordyline.—A genus of handsome foliage plants, mostly requiring stove treatment. There are, however, two species

that are nearly hardy—*C. australis* (which grows in the open air in Devonshire and Cornwall to the height of 20 ft. or more, the straight stem surmounted by a large tuft of palm-

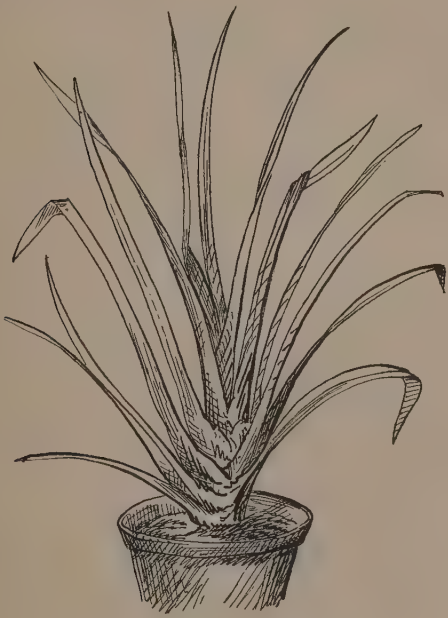


FIG. 52.—Cordyline.

like leaves); and *C. indivisa*, of which there are several finely coloured varieties. Large specimens can be grown in quite small pots, provided that they have plenty of water in summer, and are frequently syringed. In winter, except in a high temperature, they should be kept fairly dry. When they get bare at the bottom, they should be treated as described

at the beginning of the chapter. Some of them are often wrongly called dracænas.

Cyperus alternanthifolius.—A rush-like plant with long, narrow leaves arranged in a whorl around the top of the slender stems. There is a variegated form. All plants of this class should be grown in moist soil.

Dracæna.—The greenhouse or room plants usually grown under this name are cordylines. Dracænas require stove treatment, and are therefore outside the range of this book.

Eulalia japonica.—A handsome grass, which, though hardy, is often grown in pots. The two most ornamental forms are *Foliis striatis*, which has a yellowish white stripe along the centre of the leaves, and *Zebrina*, in which yellow stripes cross the leaves. Propagation by division in spring.

Eurya japonica.—An evergreen shrub requiring protection in winter. There is a variegated form which is more ornamental than the type. The cause of variegation is obscure, but it is a curious fact that the majority of variegated shrubs come from Japan.

Fatsia japonica.—This is the correct name of the evergreen shrub popularly known as *Aralia japonica* or *A. Sieboldii*. There are two variegated forms, one with white markings and the other with yellow. For cultivation, see **Aralia**.

Ferns.—Though ferns are among the most popular of room plants, they are far from being well adapted to the purpose. It is true that they mostly grow in shady places, but they require plenty of moisture in the atmosphere as well as in the soil, and that is impossible in a room. Their delicate fronds, too, are soon injured by dust and dirt, and by the emanations from fires or from the burning of gas or oil. Of course the hardy species need no protection from frost, but for those that are more tender, the best place is a greenhouse with a north or east aspect. There, by watering the floor in summer, the atmosphere can be kept as moist as may be required. The successful cultivation of ferns is largely a matter of the proper management of the water supply. But the fact that they need a great deal of moisture does not mean that the soil should be kept

saturated. Few plants, except those accustomed to living in bogs, can grow under such conditions. Water in excess destroys the bacteria which contribute so much to the fertility of the soil, turns it sour because the decomposition of its acid constituents is thereby prevented, and drives out the air which is necessary to the growth of the roots. The more water a plant requires, the more important it is that the soil should be porous, and that there should be a fairly thick layer of drainage underneath, in order that any surplus should get away quickly. More sand than usual should therefore be mixed with the loam and leaf mould, and though the whole should be firm and not spongy, it should not be rammed hard as for most shrubs, for the roots of ferns are not strong enough to force their way through it if it is very solid.

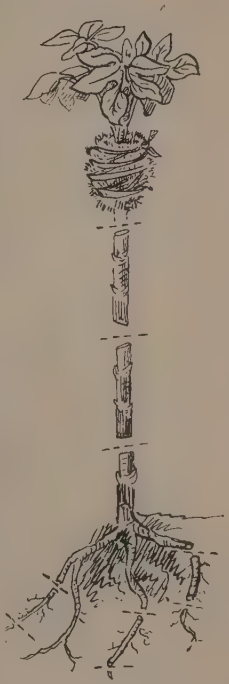


FIG. 53.—Renovating the top of an Aralia (*Fatsia japonica*), the stem and roots divided to make cuttings.

When repotting is necessary, the best time to do it is early spring, just as the young fronds are beginning to grow. Ferns have less vitality than more robust plants, and as it is at its lowest ebb while they are dormant, it is not always safe to disturb them then. Some of the old soil should be worked away with a pointed stick, and fresh soil substituted for it. At the same time those that (like adiantums) spread by means of additional crowns can be divided. Davallias and

others with creeping rhizomes can easily be propagated by laying—merely pegging down the rhizomes and cutting them off and potting them separately when they are rooted. Some species, such as aspleniums, bear little plants along their fronds. In their case, if a frond is laid on damp soil and pegged down to prevent its moving, and sprinkled with sand, the little plants will soon root and increase in size. Spores can also be scattered on the surface of sandy soil—preferably as soon as they are ripe—and if they are kept warm, moist, and shaded, little plants will be obtained.

Aphides and various kinds of scale are the chief pests. The former can be destroyed by vaporisation—there are several suitable preparations on the market—or by spraying, but it is best to remove the latter with a brush dipped in an insecticide. If a plant looks sickly without any apparent cause, it should be turned out of its pot and the roots examined. A species of mealy bug (see illustration, p. 23) may sometimes be found among them, or possibly the larvæ of a weevil. Spraying with an insecticide will destroy the former, but it must be repeated, or a little vaporite may be tried. The larvæ should be picked off. In the beetle stage they injure the fronds, and may then be captured by coming upon them suddenly with a light at night and shaking them on to a sheet. It must not be forgotten, however, that injury to fronds may be due to slugs, for which a careful search should be made.

Ficus elastica (Indiarubber Plant).—A well-known greenhouse or room plant. Its large, leathery, glossy leaves must be kept clean, but as it is less liable to be injured than most plants, it is better adapted for standing in draughty halls. When kept indoors it should be put outside at least once a week and thoroughly sprayed or sponged. When it requires a larger pot it should be moved without disturbing the roots. In course of time—a comparatively short time if it is neglected—the lower leaves will wither, and when it begins to get shabby it should be treated as recommended at the beginning of this chapter.

Grevillea robusta.—A handsome Australian shrub

with fern-like foliage. It is a popular room plant, and needs only protection from frost in winter. It grows in time to the height of about 5 ft. If it is then too tall, cuttings can be taken and rooted. With ordinary care in watering,

FIG. 54.—Grevillea robusta.

repotting when necessary, and cleansing from dust, it retains its lower leaves fairly well; but if neglected, it is sure to become "leggy."

Kochia tricophilla (Mock Cypress).—This plant is merely an annual, but a very fine one. If pinched back occasionally, it forms a dense mass of feathery green leaves,

which turn to a rich crimson in autumn. When well grown it is very effective in pots. The seed should be sown in the greenhouse in March.

Ophiopogon jaburan variegatum.—Another Japanese variegated plant, with striped grass-like foliage and blue flowers; see p. 41.

Palm.—An extensive natural order containing many different genera, mostly very ornamental, and requiring warm greenhouse or stove treatment. One species, however, *Trachycarpus excelsa*, is hardy enough to live in the open air all the year round in Devonshire and Cornwall and in some parts of Ireland; some of the others can be grown in a room; and there are few, if any, that cannot be brought into the house for a time during the summer. The strong, hard leaves are better able to resist unfavourable conditions than those of more delicate plants; but if those conditions are long continued, the tips wither and eventually the plants may be killed. Among the most suitable species are *Areca Aliciæ*, *Cocos Weddeliana*, *C. plumosa*, *Kentia* (or *Howea*) *Fortunei*, *Livistona chinensis*, *Phœnix dactylifea* (date palm), *P. reclinata*, *P. rupicola*, *Seaforthia elegans*, *Trachycarpus excelsa*, and *T. Fortunei*.

For room decoration palms have one great advantage—large specimens can be grown in comparatively small pots. But in that case it is more than ever imperative that they should be abundantly supplied with water in summer—even in winter they should not be allowed to get dry, though, of course, they should be drier—and that weak liquid manure should be used at intervals, after the soil has been thoroughly moistened, never while it is dry, for the liquid would not then be dispersed about the whole pot, but would be confined to the top layer, the roots in which might be injured. The leaves should be kept quite clean. If palms are grown in a room they should be put outside at least once a week and thoroughly sprayed. If they are infested with scale, red spider (the result of having been kept too dry), or any other insect, they should be sponged with an insecticide and afterwards sprayed with clean water. The roots are

sometimes affected by the same species of mealy bug as is found on the roots of ferns (see p. 23). When repotting becomes necessary, the roots should not be disturbed. The plants should be lifted out of their old pots and transferred to others slightly larger, but not planted any deeper than they were before. The vacant space should be carefully

FIG. 55.—Pandanus candelabrum variegatum.

filled, and the soil—turfy loam mixed with sharp sand—should be rammed down firmly. In a warm greenhouse it is not difficult to raise palms from seed, and, though growth is slow, it is interesting work.

Pandanus (Screw Pine).—There are several very handsome species, notably *P. candelabrum variegatus* (which bears some resemblance to an agave) and *P. Veitchii*. They are usually classed as stove plants, but they can be grown in a

warm greenhouse during the winter, when they should be kept fairly dry. They are not infrequently seen in rooms in the summer. They can be propagated by means of offsets.

Phormium tenax (New Zealand Flax).—Hardy in the southern counties, but requiring the protection of a greenhouse in the north. It has long, flag-like leaves which in some varieties are purple or striped with white or yellow. The flowers are small, yellow or orange. A fine pot-plant of easy culture. When it grows too large it can be divided in spring.

Yucca.—The best species for pots are *Y. aloifolia* and *Y. filamentosa*. Of both there are several varieties with coloured or variegated leaves. They can be grown in an ordinary greenhouse, and can be propagated by division of the crowns or by cuttings of the roots.

CHAPTER XII

BULBS IN POTS, BOWLS, AND GLASSES

A TRUE bulb is a thickened root stock provided with a central stem and surrounded by fleshy leaves, as in the hyacinths and lilies. Its nature can be seen by cutting off the growing point of the stem. When this is done the buds in the axils of the leaves lower down start to grow and produce numerous small side-shoots or bulbils, which, if taken off and planted separately, will flower as soon as they are large enough. This is the way in which any particular variety of hyacinth is propagated.

If the thickened root-stock is solid—that is, destitute of the surrounding leaves—it is called a corm when it is upright and more or less symmetrical, as in the crocus, and a tuber when it departs from that shape and is provided with several buds or eyes, as in the begonia or dahlia, instead of only one. In popular phraseology, however, the word bulb is often applied to all three forms. A rhizome, it may be mentioned here, is merely an elongated tuber which creeps along the surface of the ground. For instance, among ferns the Davallias are rhizomatous, and among other plants many species of iris.

The thickening of the root-stock in bulbous plants is due to the fact that they earn more food than they are able to spend in the same time, their savings being stored up at the base of their stems. There is, of course, no purpose in their economy; they are merely the passive subjects of their environment. They grow naturally in seasons of plenty, when the temperature is most favourable to them. Towards the end of those seasons, as the result of the gradual change

in the conditions, they cease to make growth and form flower-buds instead; but, as a rule, the change—usually increasing

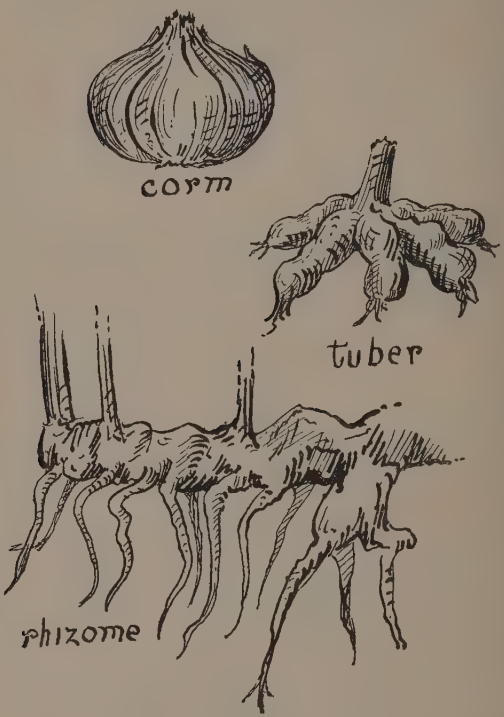


FIG. 56.—Corm, Tuber, and Rhizome.

heat and drought, or it may be increasing cold—becomes too much for their further development, and instead of opening their buds at once, they go to rest for a time, and do not spend, until the following season, the material which would

otherwise have been used in floral production. That they have a sufficient store for the purpose can be proved by growing hyacinths in pure water; they are then enabled to flower perfectly without any addition of food. The growth is, of course, at the cost of their substance—their internal supply—the bulbs diminishing in size and, unless subsequently

FIG. 57.—Lily Bulb, with two sets of roots.

planted in soil or otherwise provided with food, eventually dying. There is, however, one bulb, or rather tuber, *Saurormatum guttatum*, sometimes called Monarch of the East, which does not need any additional moisture for the production of flowers. It contains not only enough food, but also enough water for that purpose. Placed dry and without soil on a table or a shelf in a room, it is able to flower; but afterwards, as previously stated, it must be planted to enable

it to make roots and leaves, and by these means to renew its internal store.

Hence the importance of good roots and leaves. Without them, as we have seen, a bulb may be able to flower, but afterwards it must dwindle away. The roots gather in the raw material; the leaves elaborate it and convert it into food. In the case of certain lilies which have two sets of roots, one at the base of the bulbs as usual, and the other at the base of the flowering stems, the upper set assists in providing additional material for the flowers; but in other cases, all or most of the material is obtained from that previously stored in the bulbs, and the function of the roots at their base is to keep up and increase the supply. For this reason, in the cultivation of bulbs every effort should be made to get strong roots in advance of top-growth, and this applies even when they are in flower, though all that the roots can do then is to provide the necessary amount of water for the solution of the solid materials. Unless, therefore, bulbs are completely covered with soil or fibre, they should be kept in the dark until they are well rooted, for top-growth is stimulated by light.

If plants are to give satisfaction and remain healthy in pots, the conditions must be as nearly as possible similar to those to which they are accustomed in their native habitat. And as their development is interrupted in the latter case, it must also be interrupted in the former. In other words, though they should be plentifully supplied with food and water while they are growing, they should, towards the end of their growth, be fully exposed to air and sunshine and gradually dried off — completely dried off if they are deciduous, and kept very much drier than before if they are evergreen. If desired, the deciduous species may be turned out of their pots and replanted later; but if so, they should be kept in dry sand or something similar which will preserve them from extreme changes of temperature, as well as prevent their being excessively dried owing to exposure to the air.

For room decoration, bulbs are often grown in bowls of

fibre. It is supposed to be cleaner than soil, but that is its only advantage. If it is kept moist it supplies the water necessary for the development of the flowers, but it does not provide food. The bulbs, therefore, deteriorate, and are useless for growing in this way a second time, though they may, when they have served this purpose, be planted out in

FIG. 58.—Hyacinth bulb in water.

the garden. The difficulty with bowls is to regulate the supply of water properly. As there are no holes in the bottom, there is always the danger that the fibre may be kept too wet, and, on the other hand, the desire to avoid this may result in its being too dry; it should be only slightly damp until growth commences, and afterwards the amount of water should be increased.

When such bulbs as hyacinths are grown in glasses they

should nearly, but not quite, touch the water. There is always a certain amount of evaporation, and the vapour, condensing on the base of each bulb, will keep it sufficiently moist to induce the formation of roots, but not moist enough to cause decay. The best position for the glasses is a warm cupboard. They should not be in the light until the roots are strong enough to support top-growth. When this stage is reached they should be brought out, kept for a few days in the shade, and eventually moved into a sunny window. There they may remain until they flower. As the result of evaporation, and also of absorption by the roots, the water will sink in the glasses, and any loss should be made good. A piece of charcoal is sometimes put in each glass to keep the water pure, but it really is not necessary.

The number of bulbous plants which can be grown in pots of soil, bowls of fibre, or glasses of water is very large. It is not possible here to enumerate more than a few of the best of them.

Agapanthus umbellatus.—A handsome plant, nearly hardy, belonging to the lily family, with bunches of blue flowers. There are several varieties, some with white flowers, others with various shades of blue, one of them double, and others again with variegated foliage. They may almost be called succulent, the stems and leaves are so fleshy, and they require so much water in summer. In winter they should be kept nearly dry. A high temperature is not necessary for them, only protection from severe frost. They flower best if left undisturbed in their pots. Propagation by means of offsets.

Anemone.—Many of the anemones make excellent pot plants, especially the numerous varieties of *A. coronaria*, and for early flowers *A. blanda* and *A. hepatica*. The woody crowns or tubers should be potted rather thickly in rich, sandy soil in autumn, and when they begin to grow, kept well supplied with water. After their flowers wither they may be planted out in the garden.

Arum Lily.—See **Richardia**, p. 143.

Begonia (Tuberous).—If seed is sown about February

in a warm greenhouse, the young plants will flower a little during September. As it is very small and powdery, it should be sprinkled thinly on the surface of firm, smooth, sandy soil, and gently pressed in. To avoid the risk of smothering the tiny seedlings it should not be covered with soil, but glass should be laid over the top of the pot or box to check evaporation, and also paper to exclude the light. If the soil should become too dry it should be moistened by immersion, as described for annuals. When the seedlings appear they

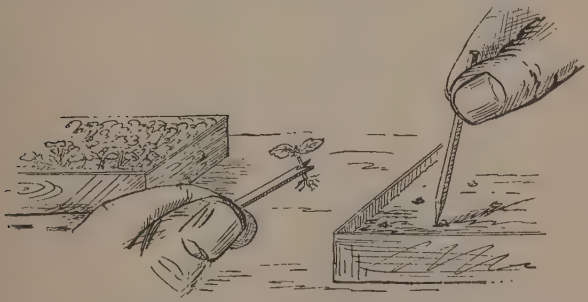


FIG. 59.—Pricking out seedling Begonias, lifting them with a notched match, and making holes for them with a pointed one.

need more light (not strong sunshine) and fresh air, and when they are large enough they should be pricked out in a box of similar soil, from which, at a later stage, they should be transferred with as little disturbance as possible to small pots. In October, when the foliage begins to change colour, they should be gradually dried off. When the stems drop off, the small tubers may be taken out of their pots, cleaned, and stored in a bag of dry sand where they will be safe from frost. Early in the following March they should be planted again in small pots of light, rich soil, placed in the greenhouse, and watered very little until growth commences. As soon as the pots are filled with roots they should be moved into larger ones, and in order to afford support to the stems, sunk a little

deeper in the soil. At all stages of their growth their requirements are warmth, moisture, and shade from strong sunshine. In autumn they should be treated in the same way as before. Tuberous begonias are at their best in their second and third years. Afterwards it is generally advisable to replace them by raising fresh stock from seed, or else by purchasing young tubers.

Canna.—A genus of tuberous plants with tall, upstanding stems, handsome green or bronze foliage, and magnificent flowers, chiefly yellow and red. They are often grown in pots, and are also largely used for summer bedding, in which case, if they are carefully lifted and potted in September before they are injured by frost, they will continue flowering for a long time in the greenhouse. It is easiest to start with tubers, which can be purchased from any seedsman for a few pence apiece. They should be treated in the same way as begonias, except that as cannas make much more growth, they require richer soil and more water. In winter when the stems die down, the tubers should be kept nearly dry—quite dry if the temperature is very low. If desired, they can be divided in the following spring. Plants raised from seed sown in February in heat will flower the same year, but not so freely as tubers. The seeds are large, round, and very hard, for which reason cannas, many species being of Indian origin, are sometimes called Indian shot. Each seed before it is sown should be scratched with a file, so as to cut the outer skin, and should be soaked in hot water for about twenty-four hours.

Chionodoxa (Glory of the Snow).—There are several species and varieties, mostly with bright blue flowers with a white centre. They flower early in the year, and are easily managed. As they are small, they are suitable for small pots, in which a number of the bulbs should be planted about 1 in. apart.

Crocus.—The corms should be planted close together in pots of sandy soil or bowls of fibre, early in autumn. They may be put outside until they begin to grow, but it is better to bring them in before severe frost, or to protect them in

some way from great changes of temperature. In the case of pots, this is most easily done by covering them with ashes. Crocuses should not be subjected to much artificial heat, but when they approach the flowering stage a little additional warmth will not hurt them. Their fault as pot-plants is that

FIG. 60.—Cyclamen in pot, the corm partly above the soil.

the flowers are soon over. They last longer if they are not exposed to strong sunshine.

Cyclamen.—There are a number of hardy species, some flowering in spring and others in autumn. They are, however, less commonly grown in pots than the greenhouse species, *C. persicum*, which has finer flowers, and of which there are many beautiful varieties. Corms can be bought either dry or flowering in pots, or plants can be raised from

seed. The seed can be sown either in spring or in autumn. When the seedlings are large enough they should be pricked out about 2 in. apart in a box. Before they begin to crowd one another they should be transferred to small pots of sandy loam and leaf-mould, and, when necessary, to larger ones, the corms not buried in the soil, but partly above it. A position shaded from strong sunshine is the most suitable for the plants, and during hot weather they should be sprayed frequently, otherwise they are liable to be attacked by red spider. To get rid of these pests, and also of thrips and aphides, the foliage should be sponged with an insecticide. Spraying is of little use, owing to the difficulty of wetting the lower sides of the leaves where the insects are mostly to be found. The young plants should be kept growing during the whole of the first winter in a temperature not below 50° F., and during the following season until they have flowered, when they may be dried off a little, but not entirely. The corms are often thrown away when they are more than three years old. The flowers then get much smaller, but sometimes are very numerous.

Daffodil.—See **Narcissus**, p. 142.

Freesia refracta.—This well-known plant has strongly scented white flowers blotched with orange. There is a variety (*alba*) which is pure white. The small bulbs should be potted about 1 in. apart and ½ in. below the surface in loam, leaf-mould, and sand from August onwards. The best position is a shady frame or greenhouse, or a west window. If the soil is moist little or no water should be required until the leaves appear, when the supply should be increased. The pots should then be moved into a lighter position, in order that the plants may not get too tall. When the foliage begins to wither, they should be dried off. The bulbs may remain in the soil, or they may be stored in sand until they are wanted again. Freesias can easily be grown from seed. If it is sown as soon as it is ripe, many of them will flower in the following season.

Galanthus (Snowdrop).—The finest species is *G. Elwesii*, which is therefore the best for pots. The bulbs should be

planted early in autumn, and should be kept in a cold greenhouse or frame until growth appears, when they may be brought into a rather higher temperature.

Gladiolus.—The dwarf species, such as Ackerman (salmon blotched with violet) or The Bride (white), are the most suitable for pots. They flower in June or July. But if they are potted in batches at different times, their season can be greatly prolonged.

Gloxinia.—These beautiful plants should be treated in the same way as begonias, except that the temperature should be rather higher. If raised from seed sown in February they will flower in summer. But better results will be obtained with young tubers, which should be started in boxes of sandy soil laid on bricks on the hot-water pipes, and potted as soon as they begin to grow. Failures with gloxinias are not uncommon. Sometimes the plants produce a great number of leaves and only two or three flowers, and sometimes, as in "blind" cauliflowers, there are very few leaves and no flowers. In the former case the cause is excessive richness of soil; in the latter it is some check to growth, possibly disease, but most frequently some cultural fault, such as the use of cold water drawn from a tap or from an outside tank. If there is a tank inside the greenhouse the water from it may be used, but if it is first made lukewarm it will be still better. Artificial fertilisers should not be applied to gloxinias until they have formed their flower-buds, and even then the application should be weak. When the plants have finished flowering, they should be gradually dried off like begonias, and afterwards should be kept quite dry, either in their pots or in a box of sand in the greenhouse, or in a warm cupboard.

Hyacinth.—Only the best bulbs should be grown in pots, bowls, or glasses. They should be large, solid, and heavy. If they are flabby, they have been so long exposed to the air that they have lost an excessive amount of moisture. If they are loose and show a tendency to split, and especially if the central point is damaged, they will break up into offsets instead of concentrating on the production of a single flowering stem. And the heavier they are for their

size, the larger the amount of material—that is, of stored food—they contain, and therefore the more likely they are to produce fine flowers. Single varieties are generally more satisfactory than double, and blue or white than yellow or red. The so-called Roman hyacinth is really of French origin. It is not a distinct species, but a small and early variety. "Dutch Roman" bulbs which are sold by some firms are merely young bulbs of the ordinary hyacinth, and flower at the same time, not as soon as its early variety.

The soil for pots should consist of loam and either leaf-mould or thoroughly decomposed manure in a crumbling condition, with enough sand to make it porous. If there is a layer of sand for each bulb to rest on it will hasten rooting. In order to allow as much space as possible below for root-growth, the tops of the bulbs should be near the surface, and in order to exclude the light it is a good plan to sink the pots in ashes, and to leave them there until top-growth commences. The ashes serve two other purposes: they prevent the bulbs from being forced upwards by the pressure of the roots underneath them, and if the pots are on the ground they prevent the entrance of worms. The soil should be kept slightly moist until the commencement of growth, when more water is needed. At this stage the temperature may be raised, and when the flower-buds appear it may be raised again. It is rarely worth while attempting to grow the same hyacinths a second time in pots, especially if they have been forced. They should be planted out in a shrubbery or some other part of the garden.

In bowls of fibre they should be treated in much the same way as in pots. In glasses of water they should be kept in a dark cupboard until they have formed strong roots and begun to make top-growth.

Iris.—The species most commonly grown in pots are *I. xiphioides* (English iris) and *I. xiphium* (Spanish iris), both of them bulbous, the latter being perhaps the more suitable because it is the smaller. There are a number of beautiful varieties, and unnamed bulbs can be obtained for a mere trifle. They should be placed outside after they have

finished flowering, and gradually dried off. In August or September they may be repotted or, if they still have plenty

FIG. 61.—Rhyzomatous Irises

of space, left in the same pots, provided that some fresh rich soil is added. See also p. 75.

Ixia.—The bulbs should be potted in autumn, and kept in a greenhouse or a frame. Unless the temperature is high they will need very little water until spring. In other

respects, though less hardy than Spanish or English irises, they may be treated in the same way.

Lilium (Lily).—There are a large number of magnificent species, among the most popular being *L. auratum* (golden-rayed lily of Japan, large open white flowers with yellow rays and crimson blotches), *L. longiflorum* (white trumpet-shaped), *L. speciosum* (large open flowers, many fine varieties), and *L. Thunbergianum* (or *elegans*—erect, cup-shaped, dwarf, ranging according to the variety from yellow to crimson). The two first produce roots at the base of the stems as well as at the base of the bulbs (see p. 131), so when they are planted some space should be left in each pot for additional soil for covering any roots that may show above the surface. A little peat may with advantage be mixed with the soil for all lilies. When the bulbs—which, as in the case of hyacinths, should be firm and solid—are planted, some sand should be laid under each, and a little more sprinkled round them. The usual rule as regards water for this class of plant should be observed—at first only sufficient to keep the soil slightly moist, and a gradually increasing supply after growth commences. All lilies are most satisfactory in partial shade. In strong sunshine the leaves soon turn brown, and the flowers do not last long. When the stems die down the bulbs should be dried off, and a month or two later they should be repotted. There are several fungoid diseases to which lilies are subject. It is difficult, if not impossible, to cure them, as they develop inside the tissues and only show externally when the damage is done. Badly diseased bulbs should be burned; those which are only slightly attacked should be sprayed with a solution of sulphide of potassium ($\frac{1}{2}$ oz. to 1 gal. of water), but not near painted woodwork, which is blackened by the liquid. Doubtful bulbs should be immersed for a quarter of an hour, before they are planted, in a 1 per cent. solution of salicylic acid.

Lily-of the-Valley.—See **Convallaria majalis**, p. 81.

Narcissus (Daffodil).—Excellent plants for pots in bowls. If good bulbs are selected they never fail to flower satisfactorily, provided that the usual rule as regards moisture

is followed, and that no attempt is made to grow them in a high temperature. There are almost innumerable species and varieties. For early flowers, *N. Tazetta papyraceus* (Paper-white narcissus, one of the polyanthus class) is the

FIG. 62.—Richardia, with offset, which can be cut off and planted separately.

best. A very charming species for pots is *N. bulbocodium* (Hoop-petticoat narcissus). Any of the ordinary daffodils can easily be grown in this way, but the singles are better than the doubles, as the flowers, not being so heavy, are less liable to fall over.

Richardia. — The common species, *R. africana*, is

popularly known as the Arum lily, or sometimes as the Calla lily. In South Africa, of which country it is a native, it is not infrequently called the pig lily because the tubers are eaten by pigs. It is not really a lily, but, like the lords-and-ladies of our English hedgerows, an aroid. It begins to make its growth in September, and as it is tender it should from that month onwards be kept in a greenhouse or in a room where it will be safe from frost. The large leaves must be kept clean, and if any aphides appear on them they should be washed off with an insecticide. The soil should be rich and moist, if not actually wet, for *R. africana* is practically a bog plant. Liquid manure should be applied as soon as the flowers appear in spring. After they wither, when the weather is warm enough, the plants should be put out in the open air and may remain there all the summer. They are sometimes turned out of their pots and planted in the ground—preferably in a trench like celery, so that they can be more easily watered. As the foliage dies down the supply of water should be reduced, but not stopped entirely, and in August or early in September the plants should be repotted and brought back to the greenhouse. At the same time any offsets may be taken off and planted separately. There are several varieties of *R. africana*, one of the best being Little Gem, which is much smaller than the type. For treatment of plants when frozen, see p. 22.

Scilla.—The species most commonly grown in pots is *S. sibirica*. It bears rich blue flowers in early spring. There is also a white variety. They should be planted in autumn.

Sparaxis.—A Cape genus not unlike ixia, and requiring the same treatment.

Tigridia (Tiger Flower).—A genus of bulbous plants with handsomely spotted flowers. All the species are of Mexican origin, and therefore require rather a high temperature. The bulbs should be potted in April in a cool greenhouse, or in March in a warm one. As soon as the leaves appear they should be grown in full sunshine. In autumn they can be stored like gloxinias.

Tuberose.—See **Polyanthes tuberosa**, p. 84.

Tulip.—The best tulips for pots are the early singles, which can be bought very cheaply in almost infinite variety. The next best are the early doubles, which usually flower a week or more after them. The later kinds are less suitable, most of them grow so tall, though some of the parrot class, if well managed, are very effective. As usual, only the best selected bulbs should be planted in pots, for if one fails the whole pot is spoiled. As it is not usual to consider them after they have flowered—for if they are not thrown away they are planted out in a shrubbery or in some inconspicuous position in the garden—the bulbs may be arranged nearly touching one another, the top of each slightly below the surface. The soil should be turfy loam, with plenty of sand and some thoroughly decomposed manure. It should be only just moist until growth starts, when more water is required, as well as more light and plenty of fresh air.

Vallota purpurea (Scarborough Lily).—A native of South Africa, this well-known plant owes its popular name merely to the fact that it first reached this country in a ship which was wrecked at Scarborough. It is often seen in cottage windows, where it generally does well, the warmth and light suiting it. It should be planted firmly in good soil, only the lower part of the bulb below the surface, and should not be disturbed until it is absolutely necessary, as when pot-bound it flowers best—in September and sometimes again in spring. As it is evergreen, it should not be allowed to get dry at any time. There are several varieties, differing slightly in colour and size.

CHAPTER XIII

PLANTS FOR WINDOW BOXES

It would be difficult to find a more unsuitable position for plants than a window box. When the window is open they are in a strong draught. Much of the dust that passes through is intercepted by and deposited on the leaves. They are exposed to extremes of temperature—hot sunshine and keen winds—and when rain falls, unless it is blown directly towards them, they get very little of it, because they are in a recess and are also overhung by the eaves. Yet when well chosen and well managed, they certainly brighten up the front of a house, and for that reason they will always be popular.

The worst material for a window box is metal, it gets so hot in summer and so cold in winter. Porcelain is little better. The box should be made of wood. If desired, it can be faced with tiles or with cork, either of which will serve as an additional protection to the roots. Cork is not so formal as tiles, but it has the disadvantage that earwigs and other insects are apt to hide in the spaces between it and the wood, sallying out at night to feed on the plants. If the box is painted with creosote it will last very much longer than it otherwise would do. The bottom should be pierced with holes in order to let any surplus water escape. As regards size, the box should fill the whole length of the sill, otherwise it cannot be fixed securely in position. In breadth it should not exceed the sill by more than 2 in., and as it is important not to shut out light from the room, 6 in. should be the outside height measurement.

Perhaps the commonest method of managing a window

box is to put in a layer of broken crocks as drainage, to fill up with soil, and to put the plants in it, pulling them out when they finish flowering and substituting others, frequently without any change of soil. Under these conditions it is not surprising that the results are far from satisfactory. It is very much better to line the box with moss or fibre—moss should be carefully examined for slugs before it is used—and to sink in it the plants in their pots. They can then be changed without any trouble. Moreover, the roots, instead of wandering away to the sides of the box where they are more liable to be dried up, are confined to the centre, and much of the surplus water which would escape from the soil and run down the wall is absorbed by the moss or fibre, thus helping to keep the roots moist, and lessening the labour of watering. Of course the pots in this case must be small, and as the plants grow, especially after they begin to flower, they will require more food, which can be given to them by means of an artificial fertiliser. The rule here, as always, should be weak and often. If it is not possible to keep the foliage clean while the plants are in the box, they should be taken out occasionally and thoroughly syringed.

FIG. 63.—Window Box, with the rain falling outside it and leaving it quite dry.

For spring, the best plants for window boxes are bulbs, such as crocuses, daffodils, hyacinths, scillas, and tulips. Wallflowers are also excellent, provided that they have been transplanted, and kept bushy and dwarf. If they are tall, they shut out too much light. Forget-me-nots, aubrietias, arabis, or some of the hardy saxifrages may be grown in front of them to hang down in front of the box.

For summer, marguerites are among the most popular plants. They are often associated with lobelias in the front row, and sometimes with calceolarias in the second row; but this mixture of three colours is not nearly so effective as a single one, or at the outside two. In other arrangements the place of marguerites is taken by asters, fuchsias, geraniums, petunias, annual phloxes, verbenas, or zinnias. Among plants which should be grown by themselves are dwarf nasturtiums and ivy-leaved geraniums. The former are so strong in colouring that they kill any other colour; the latter, besides carrying their beautiful flowers throughout the season, spread so rapidly that they soon fill a box, and as they grow down in front and also rise up irregularly, they break the straight lines and are very effective.

For autumn and winter, window boxes are often filled with small conifers or other evergreens. If, however, wallflowers are to be used in spring, they may be put in position in autumn, and will then serve the same purpose. If any of them get shabby during the winter, it is easy to replace them.

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